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THE progress being made in New York City in the abolition of grade crossings was noticed briefly last week. From the report of the commission of the second district, which has since been issued, it appears that in the whole state there ought to be spent this year \$6,000,000. The first district commission asks for \$600,000; the second district commission for \$900,000; and the work for which this money is called for will cost, it is estimated, four times the aggregate sum which is wanted from the state treasury. There are about 9,000 crossings in the state; and, on the very low estimate of \$15,000 for each crossing, the complete elimination of these danger spots throughout the state would involve an expenditure of \$135,000,000; and it will be seen that even on the basis of the large expenditure proposed by the com-

missions for this year—the approval of which by the legislature is yet to be tested—the work will take more than 22 years. But progress has been made, as will be appreciated by recalling that when the New York legislature, a few years ago, made its first appropriation for this purpose, the sums granted were such that the time in which it was estimated that the work could be finished was 400 years. The report of the second district says that the amount thus far paid out by the state treasurer on this account is \$1,027,831.

PROBABLY typical of conditions in the other five New England states is the census report for 1910 on farm conditions in New Hampshire; and, in a period not remote, it may have an important bearing on the business of the eastern railways. The number of farms in New Hampshire during the decade 1900-1910 decreased from 29,324 to 26,913, or 8 per cent.; but during the same time the value of farm lands increased from \$70,124,000 to \$85,542,000, or 22 per cent., and of farm implements from \$5,163,000 to \$5,870,000, or 14 per cent. This was in a state with no large cities and few large towns, and the population of which was almost stationary, rising in the decade from 411,588 to 430,572, or only 4.6 per cent. Here certainly is a suggestion of the dawn of better times on the New England farm—in which the railways must share—and ordinary observation and inference go to confirm the figures. They tell us of new wealth, city-made, taking up the old "abandoned" farms; of easier conditions of farm life due to such forces as the telephone, rural free postal delivery and the coming free rural parcels post; of steadily higher results of rural scientific cultivation—especially in fruit products—under the urgency and instruction of the state agricultural bureaus; and of such incidental evidence as a world's record of an acre of corn in Massachusetts and the many millions of dollars that measure the value of the potato crop of Aroostock county, in Maine. New farm distances from the railway are short, lands still cheap, and natural transportation vantage to the large cities of the East great as compared with the distant West, Northwest and the Pacific slope. The emergence of the New England farm as a railway feeder from the shadows of the long competition of the West must necessarily be slow. But manifest destiny already begins to point to enlargement of its limited freights of hay, potatoes and dairy products to others, with beef and even some of the cereals as ultimates. The situation during the coming decade forecast by those of the past one will be worth the attention of the eastern railway manager whose eye has hitherto been focused on the New England factory.

THE upward curve of railway taxation in the country is strikingly outlined by the returns of the Inter-State Commerce Commission for the first quarter of the fiscal year beginning June 30, 1910—that is to say of the fiscal year 1911. On a basis of an increase of only 1.5 per cent. in average mileage operated, railway taxes have increased from \$24,367,510 to \$26,815,072, or a little more than 10 per cent. That quarter was one of decidedly increased railway gross earnings from all sources, which rose from \$703,700,014 to \$745,134,204, or about 6 per cent. Gross operating earnings have been often suggested by authority as a fair basis of taxes and if they hypothetically be accepted as such, the difference of 4 per cent. in the ratio of increase, as compared with taxes still remains conspicuous. Compared with net operating earnings for the quarter the contrast becomes almost lurid. Those earnings fell for the quarter from \$266,447,485 to \$256,866,900, or about 4 per cent., with a divergence of 14 per cent. from the tax ratio—and, as a measure of a railway's ability to pay an additional charge is not the net a better test than the gross? The factor lacking in the figures of the commission is, of course, the fixed charges exclusive of taxes, but taxes are a prime and fundamental fixed charge, the great and disproportionate increase of which continues in the present period with the other heavy burdens which high prices, wage increases and federal and state administrative authority are loading on the railway corporations. The worst of the situation is the obliquity

of the public vision in the matter during our epoch of regulation, present and prospective. How many of our states and their citizens realize not only the absolute size of the railway taxation they profit by but its increment? Where, as to its budget, not to mention a commonwealth like New Jersey, would a state like Connecticut be where the railway taxes pay almost half of the state's annual expenses? And, all the while, it is the corporation that fills the public eye, not the stockholder who bears the final burden and whose rights as to just taxation are identical and co-equal with those of the owner of a dwelling or a shop.

THE EFFECT OF HIGH TEMPERATURES ON LOCOMOTIVE CYLINDERS AND VALVES.

WITH the rapidly increasing number of locomotives fitted with superheaters and the tendency to use steam at higher temperatures, it is important that more attention be given to the effect of high temperature on the cylinders, valves and other cast iron fixtures which are in contact with superheated steam. Experience thus far in this country has been largely with low or medium degrees of superheat, and where highly heated superheat has been used some difficulty has been found with broken cylinders, warped slide valves and rapid wear of the cylinder packing rings. The various smokebox superheaters of American design increase the temperature 25 to 75 deg. Fahr., giving a total temperature of 452 deg. Fahr. with steam at 175 lbs. pressure. The fire tube superheaters increase the temperature on an average 150 deg., giving a total temperature of 527 deg., or say, 550 deg. with higher steam pressures. In German practice, with either the smokebox or fire tube superheater, the increase in temperature is about 250 deg., giving total temperatures of 600 to 650 deg. This is regarded as highly superheated steam.

These figures must be regarded as an average of widely fluctuating temperatures, and, except when running under uniform conditions as to speed and train resistance, the temperature of the steam will often be much lower and occasionally considerably higher. Tests show that it takes some time after starting from the terminal before the desired degree of superheat is obtained, and that there is a drop with each stop and a further fluctuation of the steam consumption with changes in the speed. After the elements are well heated by a heavy fire and with the throttle partly closed, a smaller volume of steam will pass through the heater tubes with a superheat of above 150 deg. or 200 deg., making a total temperature of 600 deg. After a stop the elements cool off, and when steam is again admitted to the cylinders it may almost be in a saturated condition, thus giving a total fluctuation in temperature of about 200 deg. Fahr. It is this fluctuation in temperature that is likely to cause the most damage to cast iron fixtures of locomotives unless they are especially designed or are made of suitable composition.

Some interesting testimony on this subject will be found in the transactions of the American Society of Mechanical Engineers, 1909, Volume 31, page 989, Symposium on the Effect of Superheated Steam on Cast Iron, consisting of three papers and a discussion covering 50 pages. Among the more important conclusions are the following: (1) "Cast iron varies its behavior under high temperatures, starting from about 450 deg. Fahr., and in many cases it deteriorates in structure and strength to a marked degree. The change of structure or deterioration is much increased by fluctuating temperature." (2) "When the temperature is constant, even though it is as high as 600 or 700 deg. Fahr., the change in cast iron is not serious, but where it varies considerably the metal is certain to develop cracks and distortions that render it unsuitable for steam pipes and other parts under steam pressure." (3) "Cast iron of certain chemical constituents increases materially in volume when subjected to fluctuating temperatures above 500 deg. Fahr. The chemical composition of cast iron has a material bearing on the change of shape and volume and on the development of imperfections."

The effect of unequal heating of metal has been investigated by

engineers in the French navy, and the theory advanced seems reasonable and is confirmed by experience. Briefly stated, it is this: When one side of a piece of metal is heated to a higher temperature than the other, the hot side tends to expand and the expansion is resisted by the metal on the cold side. This puts the metal on the hot side in compression and that on the cold side in tension, and if the temperature difference is great enough the metal will be strained beyond the elastic limit. When the hot side is allowed to cool it is shorter than the cold side, because of the strain beyond the elastic limit which has been undergone by both sides. This results in the piece taking a permanent set or becoming bow-shaped away from the side that has been heated. Other testimony presented in the same article shows considerable evidence indicating that gray cast iron subjected to changing temperatures from 450 deg. Fahr. and up gives evidence of an oxidation of the silicon present, forming silica in a micro-crystal form, which upon cooling causes the disintegration of the surface exposed ranging generally along the planes of the graphite, changing an apparently solid wall into one showing many cracks. It is the constant recurrence of these conditions, produced by changing temperatures, that in time not only produces growth but breaks down the structure of the metal.

While these quotations are not intended to create alarm or distrust regarding the superheaters now in use, it is well to call attention to the opinions of engineers who have had a longer experience with superheated steam in stationery and marine service. With the use of superheated steam in locomotives in Germany it was recognized from the first that unequal expansion of cylinders and valves, due to the higher temperatures, would require special designs for these parts, and they were worked out successfully. Our own locomotive builders have given attention to this in their designs of cylinders, and care is taken to make an almost entire separation of the piston valve chamber from the cylinder walls. When highly superheated steam is to be used, it will be found necessary to give more attention to the design of the valves and especially to the packing rings for both valves and cylinders. The composition of cast iron for such purpose is also important, the indications being that high silicon should be avoided and the percentage of this element, especially in parts subject to wear, should not average above 1.50 to 1.75.

The report on superheaters, read at the 1910 convention of the American Railway Master Mechanics' Association, states that the New York Central, with the Cole and Vaughan-Horsey superheaters, uses a special mixture for piston and valve packing rings, and other roads report the life of these rings less than half that obtained when saturated steam is used. The packing rings for piston and valve rods for medium superheat are also made with a higher melting point than those for saturated steam.

The general impression is that the Canadian Pacific is using highly superheated steam in a large number of engines, and that they have not experienced the difficulties due to high temperatures which we have referred to. We have an interesting letter from Mr. Vaughan in this connection, from which we quote a portion to give a better understanding of the Canadian Pacific's experience with superheated steam:

"We have only had one locomotive which really used high superheat. Most of our engines do not exceed 550 deg. Fahr., with perhaps 580 deg. as a maximum; whereas the Schmidt Company has largely advocated about 650. I have always thought that we were using medium superheat, and we have done this not so much because we believed in it or objected to the use of so high superheat, as on account of our failing to get high superheat with the arrangement of fire tube superheaters that apparently proved most satisfactory. With the temperatures we have worked on, which you may say are in the neighborhood of 550 deg. Fahr., we have not experienced any trouble whatever in connection with the cast iron. Our superheater headers, steam pipes and cylinders are cast iron, and while in our

earlier designs we did have a number of failures on account of the cast iron headers cracking, we were convinced that it was because of poor design; that was fairly well demonstrated by headers of a modified design giving no trouble. I think it is safe to say that we have had cast iron headers in use for over five years without experiencing any difficulty from their failure, which, it seems to me, shows that any difficulty experienced on this score is as much a question of design as material. On the engine fitted with the Schmidt superheater, in which very high temperatures were sometimes obtained, we have had trouble with broken cylinders, but I am not in a position to say whether this was due to any deterioration of the iron or to the design of the cylinders.

"Anyone having trouble with cylinders had better look to the foundry practice and to the design of the cylinders. I should feel that the defects are being ascribed to superheated steam largely from the general tendency to always blame any new thing for anything that happens. With superheated steam at 550 deg. Fahr., or thereabouts, we have had sufficient experience to show that in case of any trouble it would be as well to look to the design and material first before assigning the cause of the defect to superheated steam."

The important conclusion to be drawn is that it would not be wise to use medium superheat with a total temperature of 550 deg. Fahr. on old locomotives with flat slide valves and ordinary design of cylinders. Where it is desired to use highly superheated steam—600 to 650 deg. Fahr.—special attention should be given to the composition of the cast iron in the cylinders, valves and packing rings, and to the design of these parts, so that they will not be warped and the wearing surfaces injured by the wide range of temperature to which they are exposed.

NEW BOOKS.

Proceedings of the Forty-fourth Annual Convention of the Master Car Builders' Association. Atlantic City, N. J., June 15 to 17, 1910. J. W. Taylor, secretary, 390 Old Colony building, Chicago.

The noticeable feature of this volume is its unusual size. It contains 853 pages, not including the large number of drawings and tables. The book is 2½ inches thick; half an inch is occupied with illustrations of standards, and another half inch with text describing them. The standards, therefore, take up space equivalent to a volume an inch thick. The report of the Lake Shore emergency brake tests occupies 110 pages, and, in addition, the cuts illustrating it require ¼ in. It is a question whether the drawings of standards and their description in the text should not be bound in a separate volume, leaving the main proceedings to make up a book of moderate size, with opportunity for the inclusion of any unusually long report without producing a bulky volume. Many of the standards remain the same year after year, and the slight changes which are made each year could be issued as a supplement to the proposed separate volume of standards, issued at intervals of three or five years. There would thus be not only a large saving in the cost of publishing the proceedings, but in the space they occupy in the library; the inconvenience of handling a large, heavy volume would be avoided. When books become so large the ordinary binding is hardly sufficient to hold them together if they are subjected to much rough use. The proceedings are well printed and edited.

Proceedings of the Forty-third Annual Convention of the American Railway Master Mechanics' Association. Atlantic City, N. J., June 20 to 22, 1910. J. W. Taylor, secretary, 390 Old Colony building, Chicago.

The report of the Master Mechanics' Association fills a volume of 600 pages. A large portion of it is taken up with tables and diagrams relating to the Lake Shore emergency brake tests and a long report of the committee on superheaters. Other reports of unusual interest are those on mechanical stokers, safety valves, rules for the inspection of locomotive boilers and a report on the proposed consolidation with the Master Car Builders' Association. The proceedings are well edited and printed, and are substantially bound in the usual style.

Letters to the Editor.

TIE PLATES AND TIE DECAY.

PITTSBURGH, PA., December 20, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The assembly in your issue of December 9 of the opinions of so many engineers on so many different railways on the important subject of the use of tie plates in railway construction, is a tribute to the enterprise and industry of your journal in collecting news and information. The illustrations show very fully the many different forms now in use, but of course the quotations given from the different letters received are necessarily limited by the amount of space in your paper that you could devote to this subject without encroaching on the space required by other departments of your work. It seems possible that in the condensation this required there may have been points omitted or overlooked which might have shed a little more light on the subject. In your editorial on the subject you say:

"For preserving gage some sort of bottom projection is considered necessary, and the details illustrated are the result. Some believe that a very slight projection is sufficient, while others favor deep knife edges. When placed across the grain the effect is no doubt bad, for the wood fibers are cut and decay is hastened. Longitudinal ribs are better, for they merely press the fibers apart, but if too close together and too deep, they have been known to cut out blocks of wood from the top of the tie, the deep ribs holding the wood firmly and shearing off the fibers at the bottom edges. With the use of screw spikes the plate with the smooth bottom is apparently sufficient."

Your statement that "when placed across the grain the effect is no doubt bad, for the wood fibers are cut and decay is hastened," is, to say the least, a very doubtful proposition, and one upon which there is a great diversity of opinion. Among your correspondents there are many who are using millions of tie plates which have sharp claws on the bottom which cut across the fiber of the tie, and, while they may not be an entirely perfect device for the purpose required, nevertheless they perform the required function better than any other device at present on the market. If your dictum as stated by you is correct, it would rather appear to be somewhat of a reflection upon the judgment and intelligence of the engineers responsible for the use, at an increased cost, of a device which you pronounce to be without doubt "bad."

In almost every kind of wood construction it is necessary to cut wood across the grain, but in such cases we hear nothing of it being bad or hastening decay. What does prove bad, both in cutting across the grain and longitudinal with the grain of the wood, is when the cutting is done with a blunt instrument which mutilates the fiber. When this is done, the mutilated fiber is, when wet, rapidly reduced to a condition of pomace, which by inaccurate observation might be mistaken for decay.

The best answer to be found to the proposition that cutting across the grain of the tie is deleterious to its life is, that all the rails on all the railways of this country, with infinitesimal exceptions, are held in place by a device of this kind, viz.: the hook headed railway spike, which has kept its place in railway construction ever since the commencement of the railway era, notwithstanding the numerous attempts made to displace it. It is not claimed that it is an ideal fastening, as there may be a better one produced in the future, but take it all around, with its many imperfections, it has given the best results of any device used for this purpose up to date, and while I have had 28 years' experience in the design and manufacture of tie plates and spikes, supplemented by close observation of their results and effects when used in track, I can safely say that while I have seen much mutilation of fiber of ties, resulting from inferior timber, blunt cutting edges, and strain beyond the capacity of the timber to resist it, I have never yet seen during this time a case in which the tie was decayed around the spike hole or aperture left by the claw, and sound outside of it.

I trust that you will review the correspondence you have on this matter, and determine to what extent you were justified in

making so sweeping a statement as that the effect of cutting across the grain of the fiber of the tie hastened decay.

WILLIAM GOLDIE.

[Our statement referred to ribs extending several inches along the bottom of the plate, rather than to lugs, such as those of the Goldie plate. In discussing the destructive effects of projections driven into wood, we would hardly compare lugs 1 in. wide with ribs running the full width of the plate, as ribs parallel to the grain generally do. Timber men have generally accepted the belief that cutting wood fibers across hastens decay more than cutting them lengthwise or forcing them apart. In most woods the cells are long and narrow so that many more cells are exposed (and so admit moisture) in a given area of transverse section than in the same area of radial or tangential section.—EDITOR.]

THE SUPPLY DEPARTMENT.*

BY H. C. PEARCE,

General Storekeeper, Southern Pacific Company.

III.

FACILITIES.

Facilities are always a necessary part of the economical operation of any plan, but we must adapt ourselves to conditions as we find them, and usually good facilities come gradually and not in proportion to the requirements. Therefore it is of much greater importance that we have an organization, for if we have

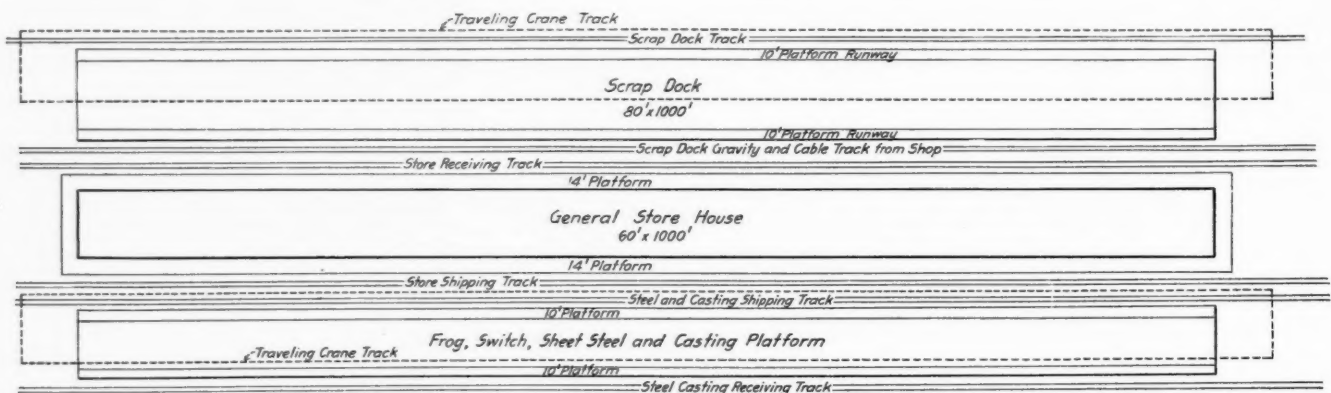
Locomotive cranes equipped with generator and magnet for handling scrap, when not in use for other purposes, are recommended for all general work, for the reason that in addition to answering the purpose of handling all heavy material by power, these cranes can be used for yard switching and moved conveniently around to different places where needed.

There should be located on every division a well-equipped division store. Sub-stores will have to be maintained locally in connection with the oil houses at roundhouses and car repair stations. In all instances enough ground can be cleared off to lay old car sills, on which to erect racks and platforms sufficient to segregate materials. There should always be a shed to protect lumber and materials which might be damaged by exposure.

If I were to say what one facility I consider most important for the proper handling of material, it would be space, and this is always available. The storekeeper who offers as an excuse for the mixed-up condition of material that he has no storehouse or place to put it never will be a storekeeper, no matter what facilities are furnished him.

SCRAP DOCKS.

Probably one of the most necessary facilities for handling scrap, surplus and obsolete materials is ample and sufficient trackage and docks for sorting, receiving and shipping. There should be one general assembling dock located at a point on a system where most of the scrap would naturally accumulate. This would, of course, be at the company's manufacturing plants,



Typical Layout for General Store.

the organization we can do business even without facilities.

This can be illustrated by one instance. At Sacramento, on the Southern Pacific, an average business of between nine and ten million dollars a year is done; that is to say, about that amount of material is received and disbursed. The largest store building is 60 ft. \times 140 ft. It was built 30 or 40 years ago, yet the organization is such that any material maintained there that is not delivered and on its way within 24 hours from the receipt of the requisition is treated as delayed and disciplined accordingly. The cost of operation will compare favorably with other well regulated stores, and is 50 per cent. cheaper than on many railways where this work is not under one department. The really efficient organization is the one which can deliver the goods whether they have the facilities or not, and get facilities as fast as possible.

As stated in a previous chapter, the ideal location for a general store is at the gateway of the property, and located at the principal manufacturing shops. Or, in other words, it should be as close to the market as possible; and the company's shops being its best market, it should necessarily be there. An economical lay out for a general store is shown herewith. Many supplementary facilities and details can be added to this; but the general outline of the arrangement as here shown would, to the writer's mind, present an ideal arrangement for the prompt and economical handling of most material.

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where everything possible will be used in its industries, rolling mills, foundries, etc., and everything available worked over for future use. If possible it should be situated at a point as close to the company's source of supply as the road will permit; in other words, at the gateway. It is, of course, necessary to have local scrap docks at the division shops, but the general scrap docks are of first and greatest importance.

In arranging them the first consideration must be room and trackage, for they must be available by ample track facilities for economical and prompt switching. A modern, general scrap dock with modern appliances is shown herewith. It provides for using electric magnets, either with a locomotive or a gantry crane. The idea is that with the use of the magnet it is not necessary to have docks for the scrap. This expense is thus saved, and the additional room made available, but for sorting it is necessary to have a platform. The magnet picks up the scrap and the operator spreads it over the surface of the dock when he releases the current, thus enabling the men more quickly to segregate the material than they could by picking it out of the pile. The opposite side is utilized for assembling usable material recovered from the scrap. Located here are the shears, hammers, bolt cutters and other necessary tools for working over and making usable such material as can be recovered; at the same time it is all piled up and made accessible for use.

In laying out this plan the writer had in view the use of traveling cranes for loading and unloading, equipped with

generator set and electric magnet. Much money is now lost in handling scrap, in fact a great many roads are actually spending more money in handling and recovering scrap, etc., than it is worth, and unless the very best facilities are provided, and a permanent and efficient organization is maintained solely for the purpose of handling scrap, these losses will be very considerable. A great saving in handling scrap is the good material that is recovered, and no matter how careful men are along the line, at outside and division points, in sorting and handling scrap there is bound to be a large quantity of serviceable material loaded and shipped in as scrap, so that a second or third sorting is necessary. This has been clearly proven by accurate records.

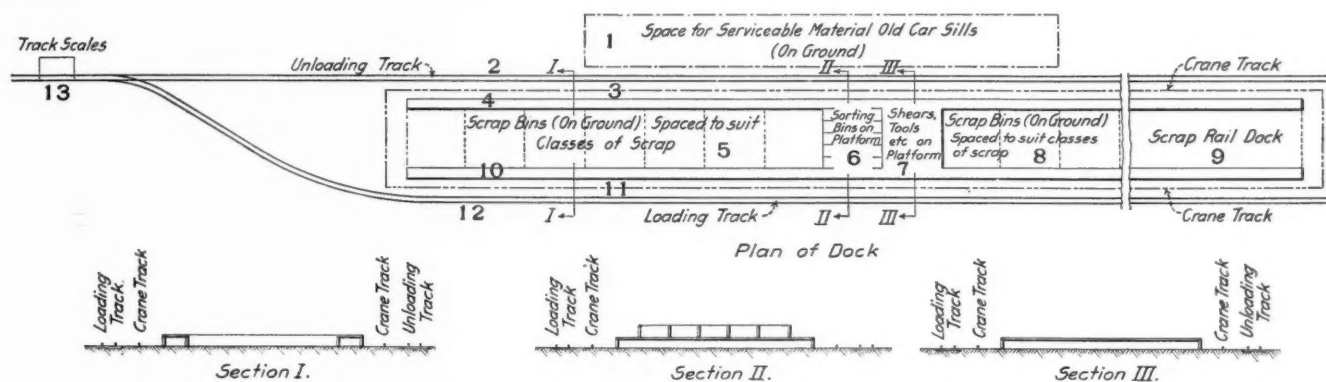
DIVISION DOCKS.

The plan of the docks at division shops must be determined very largely by the conditions and location of the shops and car repair yards, and it must be taken into consideration in laying out these docks that the cost must be figured from the time of the first removal of the scrap. The docks or bins should be located as conveniently as possible to the shops, at the same time being made accessible by tracks, and so arranged that the miscellaneous scrap made in and around the shops can be delivered directly from the machine or pits, either by wheelbarrows or by tram cars, with the least possible expense. Scrap coming in from off the division can in many cases be loaded

Here is where we find the results from actual service tests. Here our operating and maintenance officials can teach their men valuable lessons in real economy. They can see the enormous amount of available and usable material which has been removed, either from the track or equipment, that probably, in most cases, could have served its purpose for a longer time. It is apparent that if this material is serviceable at all it could have given its best service where it was. Not only should the loss of material be considered, but the labor connected with replacing it. The truest economy is never to remove anything until it has entirely outlived its usefulness. The volume of usable material recovered from our scrap docks is a living evidence of extravagance, and a campaign along this line, and with this evidence, will bring real results.

SUPPLY CARS.

The supply car is the connecting link between the division store and the users. Here let it be understood that the storekeeper is responsible for all unapplied material, that it is in his stock until it is put in use, and that he is responsible for it until it is actually applied. Each division should be equipped with at least two supply cars, and as many more as the requirements may demand, one car equipped with the necessary tanks for handling and distributing the oil, the other equipped with the necessary shelving to segregate the miscellaneous supplies re-



Arrangement for a General Scrap Dock.

1. Space for serviceable material made from old car sills on ground. 2. Unloading track full length of dock and rail docks. 3. Track on ground for gantry electric crane. 4. Platform 8 ft. wide full length of docks, height of car floor. 5. Scrap bins; no timber used; scrap piled on ground, and spaced to suit various classes of scrap. 6. Sorting bin; on platform about 50 ft. square with 10 small bins, built height of car floor. 7. Platform about 50 ft. square for shears, tools, etc., used for cutting scrap, etc. 8. Scrap bins; same as No. 5. 9. Scrap rail dock; used for rail, fireboxes, boilers, etc.; crane to run full length. 10. Platform, same as No. 4. 11. Track, same as No. 3. 12. Loading track. 13. Track scales. Note.—Scrap dock to have gantry electric crane, 5-ton capacity, at least 50 ft. from leg to leg, with 18-ft. cantilever each end.

in such a way that it can be billed straight through to the general assembling dock, but in many cases this is not possible and should come to the division docks, where it should be sorted over and reloaded. The purpose of this is to give the division the benefit of serviceable material which may be found, and to encourage division officers to exercise greater care in the removal of material that may be used again.

The accumulation of scrap in the car repair yards usually can be loaded up directly from the ground to the cars and shipped to the general assembling docks. Where any considerable quantities are accumulated, bins can be located at convenient points, and the scrap segregated into them in order to keep the tracks clear. About once a week these bins should be cleaned up with the crane and magnet.

The crane and magnet can be utilized, as explained in another chapter, for loading scrap at division points. About every week what there is on hand should be loaded and shipped to the general docks, or for sale, as the case may be. A careful record should be maintained at both division and general stores of the cost per ton of handling scrap of different classes, and a detailed statement in dollars and cents of the material recovered from the scrap should be made up monthly and sent to the general storekeeper.

The scrap docks on our railways are doubtless the best source of education for men engaged in buying and handling material.

quired. These cars should be of 50,000 or 60,000 lbs. capacity, equipped with 4-wheel passenger trucks, steel or steel tired wheels, heavy underframes, and reinforced draft rigging. One of the cars should have two berths, toilet, a small desk, and, when necessary, a cook stove and small commissary for feeding the men. The oil car should be equipped with both air and hand pumps, the air to be used wherever it is necessary to draw any large quantity of oil, and at the same time the hand pumps can be used for filling smaller orders. The air may be taken from the train pipe and reduced by reducing valve.

In addition to the regular supply cars, as many ordinary cars may be taken as the demands require; for example: a car for spikes, bolts and other track material, a car for available stock, and as many cars as necessary to pick up the scrap and obsolete material which will be offered.

These cars operate over the division on a schedule prepared by the superintendent several days in advance of their movement. This schedule shows the dates and train numbers governing their train movement over the division. These schedules are placed in the hands of all concerned: i. e., trainmasters, yardmasters, division engineers, roadmasters, section foremen, agents, signal supervisors, signal maintainers, pumpers, etc., who are required to be on hand to receive and deliver their material. On the days on which these trains are due, the section foremen and section men are detailed to work inside the station grounds

so as to be able to meet these cars and receive their supplies, and load all surplus and scrap material and tools which they may have on hand. This is assembled at their tool house convenient for loading as soon as the cars are spotted.

The requisitions, after being approved by the proper officials, are turned over to the division storekeeper before the car starts out, who is then in a position to know approximately what stock to put on them. These requisitions are then arranged in station order on clip files and placed in the hands of the supply car storekeeper. The division storekeeper accompanies these cars, with as many of the other division officers as possible, and the roadmasters over their respective districts. The division storekeeper delivers on the ground what he finds to be actually required, with the approval of the division officers on the ground at the time, irrespective of what the requisition calls for, and takes receipt for same on the face of the requisition.

The receiver of tools and other materials is required to return old tools and parts as vouchers for the delivery of the new. These tools and parts are either repaired and made available again, or scrapped. He is also required to turn over all surplus and obsolete material of every kind which he has picked up during the month on his section. The tool house is checked against the standard list of tools, and any surplus or obsolete tools are taken up. He is also allowed to draw additional tools or material which may be found on examination to be necessary, in order to meet the requirements which exist at that time. Gasolene, distillate, etc., are delivered in like manner, and receipts taken. All old material, scrap, etc., delivered is receipted for, and credit allowed the proper section from which it was received.

These cars are required to deliver substantially everything that is used in ordinary maintenance and operation in the way of agents' and section supplies, pumpers' supplies, signal material, and in fact everything with the exception of lumber, which is shipped from the general material yard. They are also required to pick up all scrap, obsolete and serviceable material of every kind found on the right of way, and in and around stations. At the same time a thorough inspection is made of all buildings, and at stated periods the general storekeeper and the superintendents accompany these cars and make a thorough personal inspection of the division. As soon as a carload of scrap or available material is made up, it is billed back to the division or general store, as conditions may determine.

It requires four or five days to cover an ordinary division. The balance of the month these cars are engaged in making deliveries on specified dates to the sub or local stores, roundhouses, car repair yards, etc. The cars go on local freights and are set out at sub-stores, roundhouses and car repair stations. The material is actually delivered by the supply car storekeeper to the local storekeeper. The oil storage is filled from the cars with the air arrangement described above. All surplus, obsolete and scrap in and around the shops and storehouses is picked up and taken back.

In this way a thorough inspection is made of each local repair point each month, and there is absolutely no excuse for surplus material being maintained at these points. The supply car storekeeper, representing the division storekeeper, will see that it is all picked up and brought in, as well as lending whatever assistance may be necessary in delivering and arranging the material that may be required.

These cars have been found of the greatest service; in fact they have, to a great extent, solved the most important question connected with the handling of material; that is, its delivery and the keeping of the road clean of unnecessary and useless material that has been assembled by employees because of uncertain deliveries. These cars are further used for delivering material to large jobs, and going to points where work has been under way and material left over, and picking it up and bringing it in.

(To be continued.)

STUDIES IN RAILWAY ECONOMICS.

BY W. M. ACWORTH.

III.

I promised to revert to the question whether private railway management tended to exact from the trade of the country excessive dividends. Excessive dividends might, I think, fairly be defined as being a return on the capital beyond that given by other undertakings involving corresponding risk. The question may be of some theoretic interest, but is almost without practical importance. For the concrete fact is that there is only one country, and that a country not of private ownership but of state management, Prussia, whose railways yield a return which is excessive according to the definition given above. I leave out France, where a fraction of the total capital raised two generations back yields 10 per cent. and upwards of its nominal par value, but something like 40 per cent. on its modern quotations, while the great bulk of the capital has been raised by bonds with a state guarantee. But if we take the great countries of private enterprise, England, the United States, and Argentina, it will scarcely be argued that the return on capital is excessive. It is true that particular railways have been and are exuberantly prosperous, but the prosperity of the exceptions has been a bait that has attracted into railway construction the vast masses of capital that have received only an average, or a less than average return. On the whole, there is no country where private railways have received, or seem likely to receive, excessive dividends. If there were any serious prospect that the average English dividend would go up to 7 per cent., or 8 per cent., or 9 per cent., the argument that this surplus above normal ought to go to the community that created it and not to private shareholders would have considerable weight. But, as there is no prospect whatever of anything of the sort happening, it is really not practical business to make provision for it.

If then, private companies do not earn excessive dividends, which under a state system might be available for reduction of rates, how can state ownership fulfil the common expectation and reduce rates? Will the state operate more cheaply than a private company? To ask the question of Anglo Saxon readers seems almost the same as to answer it oneself. Does anyone seriously claim that a state organization is more flexible, more accessive to new ideas than a private company? Does anybody suppose that English or American government railways would be exceptionally ready to introduce new methods, to welcome new inventions, to adopt new labor saving appliances? Labor saving appliances are supposed to imply the saving of labor, and this means dispensing with the services of men who are probably meritorious, and almost certainly voters. We all remember the story of the London Vestry which bought horse brooms and then abandoned their use because a number of scavengers objected to being dispensed with. There is no reason to blame either the vestrymen or their surveyor, or to suppose that they were sinners above all that dwelt in the metropolis. The thing is inevitable and the difficulty must be faced, at any rate as long as state railway officials have wives and families to support.

Much the largest item in the cost of operating a railway is the wages of the staff; and that these wages would be higher in proportion to services rendered under a state than under a private system is surely undeniable. Does one doubt, for instance, that in England postmen as a class owe the very large increase in their pay and decrease in their work of recent years to the organized political pressure they have brought to bear on Members of Parliament. Once more, there is no need to blame them. One may even admit that it is right that the state should be an ultra philanthropic employer. For the present purpose it is sufficient to point out that, if wages under a state system eat up a larger share of the receipts than under private management, there is so much less net revenue available for other

purposes, whether those purposes be increase of profit or reduction of rates.*

One change would certainly come under a state railway system. Under the existing system in England, and even more in the United States, every new recruit literally carries a field marshal's baton in his knapsack. Under a state system one cannot doubt that in England at all events we should have the rigidity of civil service rules: a first division recruited solely from the highest educated classes, and a second division with practically no hope of ever rising beyond subordinate positions. Personally I confess to thinking that the new first-class civil service would probably be more inclined to scientific methods and less inclined to worship the great goddess rule of thumb than their predecessors, and so far that would be, to my mind, an advantage. But we have to recognize that to close one of the main avenues still left, by which a young man without money and without influence can work his way up to a high position by sheer force of his own ability, character, and hard work has serious disadvantages, not only to him, but to the state.

I come then to the conclusion that neither from a surplus taking the present form of excessive dividends, nor from economies that can be reasonably expected in operation, is there any fund available which state management could use to reduce rates in the public interest.

One naturally asks further what rates would be reduced and what is the public interest. We may divide, as it seems to me, reductions of rates into two classes, those that will pay the railway and those that will not. By a reduction that will pay the railway we must understand such a reduction as within a reasonable time will so stimulate the traffic in connection with the article on which the rate is reduced, that the net revenue of the railway from the larger quantity at the lower rate will exceed the revenue previously derived from the smaller quantity at the higher rate.

Now reductions of this kind we are entitled to expect from private management, for they are in the interest of the railway itself. If the railway does not make them only two explanations seem possible: either the manager does not understand, or does not take the trouble to attend to his business. We have already agreed that the private manager is likely to be just as expert as the state official; I think we shall also agree that he is even likely to be "fired," to use the somewhat brutal American phrase, if he is careless or lazy. It must, however, be admitted that there may be some reason why reductions that ought to be made are not made. I have defined a reduction that ought to be made as one that will pay within a reasonable time. Now it is clear that the state is longer lived than the individual shareholder, and, therefore, that the time which is reasonably short for the state may be unreasonably long for the shareholder, depending on half yearly dividends. This seems to be a point in favor of state ownership, but, also, once more it is a theoretic point only. All railway history shows that the really great reductions have been made not on state but on private lines. To what country would any student of railway history point as the salient example of steady and rapid rate reduction? Surely the United States of America. And to what country would he point as the salient example of cast-iron rigidity? Equally surely to the kingdom of Prussia. It may not be fair to say that the Prussian rates have been kept up, in spite of a rapid increase in population and an enormous increase of traffic density, because the Prussian railways are in the hands of the state, and that the French rates have been substantially reduced, in spite of a stationary population and a much smaller and almost stagnant traffic density, because the French railways are in private hands. But the facts remain, and they are sufficiently significant to justify a distrust of *a priori* arguments.

Or, again, we read from time to time panegyrics of the state railway system of Australasia, and we are told in glowing terms how they reduce rates to encourage population and to stimulate

development in a way which could only be done by a public undertaking. And then we consider the matter in the cold light of statistics, and we find that, with negligible exceptions, up to comparatively recent times the Australasian railways have not earned sufficient net revenue to pay the interest on their debt and, therefore, such rate reductions as they have made must have been made at the risk, if not actually the cost of the general taxpayer. And how far it is wise and just to subsidise railway passengers and consignors, who after all are very far from being the whole population, at the expense of general taxation is a very difficult question.

But this is not all. The claim made on behalf of Australasia naturally leads us to compare the railways of that continent with privately owned railways elsewhere, and I think a comparison between the Australasian states and the state of Texas is not unfair. The railways in Texas have never been a burden on the treasury of the state; yet they seem to give to the community that they serve at least as good a service; and, though railway wages are certainly not lower, a cent will buy at least as much freight service in Texas as a penny in Australasia. And, if it be a question of the development of the increase of wealth and growth of population it will hardly be argued that the country with state ownership can claim the advantage.

Regarding economy of operation, a comparison between France and Prussia is instructive. Prussia is a most favorable example of state administration, owing to the fact that the executive is responsible not to the House of Commons, but to the king, and kings are not subject to political pressure. France, on the other hand, is unfavorable to private management, for the French minister of public works has enormous and indefinite powers over the companies. Prussia seems to have every advantage over France. Gradients are certainly better; on the average the cost of coal considerably less; wages, especially if pensions are included, are certainly not higher; the density of traffic is much greater. Yet the average fare per passenger mile is about the same, while the rate both for minerals and for general merchandise per ton-mile is higher in Prussian than in France.

I have just come across the following quotation† from a recent speech of M. Pattai, president of the Austrian Chamber of Deputies:

"We have always been in favor of the state taking over the railways, but if we had been able to foresee the results of the management, I assure you we should have hesitated a little longer. We are still in favor of the principle, but it does seem to us that our government has performed a remarkable feat when it has succeeded in creating a deficit on the Northern Railway.‡ The government have enlisted an army of new employees; they have gone much too far in the reduction of hours of labor; instead of commercial management they have appointed lawyers to posts that require business men or experts; they have established an entirely unpractical bureaucracy. At the present moment, we are face to face with a deficit of £5,000,000 (\$25,000,000). There would be no deficit at all if the return from our railways were that which it ought to be. I repeat that absolute imbecility has characterized the taking over of our railways. We must introduce business ideas into the government service."

(To be continued.)

A consular report says that the state of Bahia, Brazil, has just placed an order, with a French firm in Paris for 40 closed freight cars to be used upon the Nazareth Railway in this state. It is probable that considerable rolling stock for railways in Bahia will be imported within the next few years, but unless American manufacturers get into much closer touch with this market than at present, it is almost certain they will receive few or no orders.

†Journal des Transports. August 6, 1910.

‡The Northern Railway of Austria while it was a private concern paid a substantial dividend of something like 6 per cent.

*See further on this point the note at the end of this article.

JUDSON C. CLEMENTS.

Judson C. Clements, who has been elected chairman of the Interstate Commerce Commission, is the ranking member in point of seniority. He was first appointed to the commission in 1892 and has served continuously ever since. His election is only for a year, it being the understanding that a new chairman will be elected each year, the members being chosen in order of their length of service.

Mr. Knapp was criticised by the traffic representatives of shippers and commercial organizations during the later period of his service as chairman on the ground that he was friendly to the railways. Mr. Clements will not be criticised by them on this ground; he is more apt to be criticized by the railways on the ground that he is unfriendly to them. Perhaps the impression that he has been somewhat hostile in his attitude toward the railways is not justified, but it quite generally exists, and has arisen not merely from the fact that as a member of the commission he has often, when there has been a difference of opinion of the commission, been found on the side of the shippers, but from the further fact that he has several times in public addresses given utterance to views that sounded pretty anti-railway and used language in giving expression to them which was not altogether temperate.

That Mr. Clements is a man of great natural ability, however, and that he is an able lawyer are generally conceded, and the honesty of the convictions on which he has acted and of the opinions to which he has given utterance has never been questioned. Personally, he is a very amiable man with all the courtesy and kindness of the class of southern gentlemen to which he belongs.

Mr. Clements has written several of the most important opinions of the commission; one of them was that in the maximum rate cases in which the commission ordered quite substantial reductions in the freight rates from Chicago, Cincinnati and other central western points to the Southeast on the ground that they were discriminatory as compared with those from the Atlantic seaboard. It was on the appeal from this case that the Supreme Court of the United States rendered its notable decision holding that the commission by the original Interstate Commerce act was not given the power to fix rates. While the court in this case overruled the commission, there was no question of the ability with which Mr. Clements prepared the commission's opinion.

So far as the public is concerned the principal change in Mr. Clements' duties will be that he will be called on, under the law of 1898, to act as mediator in disputes about wages, and that presumably he will be the representative of the commission in conferences at the White House. Quite possibly, however, the president henceforth may not have so many conferences as he has had during the past year. As a mediator Mr. Clements

ought to be well qualified, being, as already mentioned, considerate, amiable and candid. On the commission his influence will be little, if any, greater than heretofore. Like the chief justice of the Supreme Court, he has on vital questions affecting decisions, no more votes than each of his fellow members. The main question now before the commission, that of deciding when and to what extent the railways have "proved" how much money they will make out of proposed advances in transportation rates, may well appal the wisest commissions, and the decision, when it is reached, will, no doubt, be the result of a careful weighing of the conditions by all of the commissioners.

As is well known, the members of the commission have always been appointed with a view to giving the different sections of the country representation. Mr. Clements is the member from the Southeast. His home at the time of his appointment was Rome,

Ga. He is a lawyer by profession and was active in public affairs prior to becoming a member of the commission. He began his practice at La Fayette, Ga., in 1869; was county school commissioner up to 1871; a member of the Georgia house of representatives, 1872-76, of the senate in 1877; and a member of the 47th to 51st Congresses (1881-91) from the seventh Georgia district. In politics he is a Democrat. Mr. Clements is almost sixty-one years old. He was born in Walker County, Ga., in 1846. He was educated in private schools; and served as a private and first lieutenant in the Confederate army in 1864-5. He received his legal education at Cumberland University, and was admitted to the bar in 1869.



Judson C. Clements

The report of the Cordoba & Rosario Railway, Argentina, for the year ended June 30, 1910, shows a decrease in earnings from the year before. The gross receipts for 1910 were \$3,228,710, and for 1909 were \$3,325,148. The operating expenses for 1910 were \$1,977,339, and for 1909 \$1,980,045. Net earnings for 1910 were \$1,251,370, and for 1909 \$1,345,104. The prolonged drought affected the cereal crops so seriously

that the tonnage of that commodity was reduced by 46.60 per cent. from the year previous. There were, however, satisfactory increases in tonnage of other items of traffic, notably general goods, which made the decrease in tonnage from 1909 only 3.48 per cent. The road in both years operated 180 miles. The number of passengers in 1910 was 204,027; in 1909, 188,901. Receipts from passengers were \$343,168 in 1910 and \$347,918 in 1909. The number of ton miles in 1910 was 82,428,136, and in 1909 was 81,854,825. Freight receipts in 1910 were \$2,685,265, and in 1909 were \$2,706,779. The number of train miles run in 1910 was 659,581, and in 1909 was 635,496. The receipts per train mile in 1910 were \$4.90, and in 1909 were \$5.23. Expenses per train mile were \$3 in 1910 and \$3.11 in 1909. The profit per train mile was \$1.90 in 1910, and \$2.12 in 1909. The receipts per mile in 1910 were \$17,937, and in 1909 were \$18,473. The profits per mile were \$6,952 in 1910 and \$7,473 in 1909.

**THIRD ANNUAL REPORT
OF
BLOCK SIGNAL AND TRAIN CONTROL BOARD.***

The Block Signal and Train Control Board has made its third annual report to the Interstate Commerce Commission. One year ago plans and descriptions of 835 devices intended to promote the safety of railway operation had been submitted for examination and 511 had been examined and reported upon. During the past year 102 additional devices have been presented for consideration, making a total of 937 to date. During the past year the board has examined plans of 308 devices, and has transmitted to each proprietor a statement of its opinion. One hundred and sixty-six cases remain before the board for consideration. Of the plans examined during the past year 91 covered signal and automatic train-control devices, 103 related to ties, rails, rail fastenings, switches, and other track appliances, 64 were devices relating to the construction and equipment of cars and locomotives, such as couplers, draft riggings, ash pans, headlights, etc., 30 related to adjuncts to the air-brake system and emergency brakes for cars, 9 were mail-bag catching and delivering devices, 7 were automatic hose connectors, and 4 were torpedo placers.

Outside the field of signaling and automatic train-control the board has considered few devices that were believed to possess merit.

Brakes.—In the field of train brakes no important development has taken place during the year. Most of the devices examined were of such character that their use would introduce complications into the brake system. The St. Clair Air Brake was noticed last year. The brake of the California Valve and Air Brake Company, of Los Angeles, Cal., retains all the advantages of the straight air brake and at the same time permits automatic application of the brakes. The disadvantage of being compelled to release, and thus lose braking power, while recharging the auxiliary reservoirs, as is necessary with systems now in use, is overcome, and the use of pressure-retaining valves is not necessary. In this system braking power is not affected by variations in piston travel or leakages in brake cylinder packing leathers, as pressure from the main reservoir is applied direct to brake cylinder pistons, and is thus not dependent upon variations in volume. Auxiliary reservoir pressure is used only in emergency applications of the brake, the triple valve being so constructed that in such applications the pressure stored in the auxiliary reservoirs flows into the brake cylinder and supplements train-pipe pressure. This brake is reported to have been used to a limited extent on a western railroad, but the board has not had sufficient information respecting it to be able to pass a definite opinion concerning its merits.

Headlights.—During the past year considerable discussion has taken place in regard to the use of locomotive headlights of high candlepower. In seven states, Arkansas, Montana, North Carolina, Oklahoma, South Dakota, Texas and Washington, locomotive headlights of 1,500 candlepower or over are required by law; in Indiana locomotive headlights of 1,500 candlepower or over are required by an order of the State Railroad Commission, and in Georgia the law requires electric headlights with 300 watts at arc and reflectors 23 inches in diameter. * * * Various devices have been submitted to the board intended to impart to the headlight while the engine is rounding a curve motion to turn its beam so that it will fall on the track. Most of these devices are crude. It seems unlikely that any apparatus of this kind can be made effective to meet all the conditions of reversed curves, tangents succeeding curves, and variations in curvature, that are found on many railroads, and it is probable that if full advantage is to be taken of the high illuminating

power of gas or electric headlights on roads where much curvature exists, any motion of the headlight about its vertical axis must be within the control of the engineman.

The report discusses the merits of and the objections to high power headlights, concluding as follows:

The whole question at the present is in a highly controversial state. On single-track roads, particularly in mountainous country or where fixed signals are infrequent, the high power headlight on a train affords a warning of its approach for a considerable distance, and under favorable circumstances it enables the engineman to distinguish obstructions or unusual objects on the track much farther ahead than is possible with ordinary lights. On double-track roads, and particularly on roads having three or four tracks and equipped with signals placed at frequent intervals, the prevailing opinion seems to be that the electric headlight is not only unnecessary, but is likely to cause serious errors on the part of enginemen in reading color signal lights.

Metal, concrete and composite ties.—Various forms of ties composed of material other than wood and designed to improve the condition of railway track, both with respect to economy and to safety of train operation, have been submitted to the board for examination. A number of designs as found in the tracks of several railways (Bessemer & Lake Erie, Baltimore & Ohio, Erie and Chicago & Alton) have been examined, but no report is given.

Spark arresters.—Several of these devices, designed to reduce the danger of fire set by locomotives along railway rights of way, have been presented for examination, and that of C. A. McCotter, of Indianapolis, has been observed in operation.

Locomotive boilers.—An examination was made of an exploded boiler on the Pennsylvania Railroad, and a member of the board witnessed a test of an improved form of fire box which was conducted at Topeka, September 26, on the Atchison, Topeka & Santa Fe. The test was designed to demonstrate whether this particular form of fire box, the Jacobs-Shupert, could withstand stresses which, in the ordinary form of fire box, in most cases produce ruptured sheets and result in so-called explosions. The test demonstrated that with the crown sections of the fire box raised to a temperature of 1120° F. (the water being 4½ inches below the crown sheet) the construction withstood safely a pressure of 220 pounds per square inch. Under similar conditions a fire box of ordinary construction would probably have failed.

Mail cranes.—A number of mail-bag catching and delivering devices have been presented to the board for examination. All have been examined wholly as related to the question of safety. A device on the Chicago, Rock Island & Pacific between Omaha and Davenport has been observed, and a report made to the superintendent of the railway mail service covering the safety features of the device.

Monographs.—A majority of those who have presented devices to the board for examination have manifested such unfamiliarity with actual railway operating conditions that it has seemed proper this year, as last, that the board should set forth certain principles of correct design and construction of some forms of company equipment, appliances, and structures, with a view to showing the present state of the art in such matters and of directing effort along right lines. With these objects in view, the board has had prepared monographs on the air brake, the car wheel and the electric track circuit. These monographs will appear as appendices not yet issued.

A B C System.—The A B C system of block signaling, which has been in use on the Northern Pacific for about three years past, and an account of which was given last year, has been abandoned on all but one of the divisions where it was in use, and it is to be abandoned entirely. It was introduced on a short section of the line east of Spokane, Wash., in the autumn of 1907; and the success which attended its use on that section led to its extension to the whole of the division and subsequently to other divisions, making an aggregate length of 681 miles of

*Two chapters of this report, one on automatic brake-hose connectors and one giving a list of automatic train-stop inventions presented to the Board, are omitted and will be given in a future issue of the *Railway Age Gazette*. The monographs and appendices referred to, including the Harrington train stop, will also be dealt with hereafter.—Editor.

road on which the system was worked. Following a change of officers of the operating department, it was discontinued on the division east of Livingston, Mont., February 27, 1910; and on the lines west of Cheney, Wash., it was discontinued in August. On the remaining divisions, Paradise to Cheney, 204 miles, the change is about to be made.

The interest which was taken in this system by railway officers generally was largely due to the increased safety secured by means of it as compared with the method, common on single-track railways, of conferring on trains the right to the road by means of time tables, despatchers' orders, etc.; and it was in relation to the efficiency of the system as a means of safety—that is, of preventing collisions—that it was considered by this board. It appears, however, that its adoption on the Northern Pacific was largely because of the economy thereby secured in the movement of freight trains, and the reason given by the officers for going back to the old system is that, although in the use of the A B C system they secured the advantages expected, so far as freight trains were concerned, there was a disadvantage in that important fast passenger trains were delayed.

The board has not had opportunity to make a thorough inquiry concerning the situation since it was advised of this change; but a letter from an officer of the road indicates that this delay of passenger trains, together with some inconveniences when line wires were broken or otherwise unavailable for use, was the reason for changing.

As the movements of all trains are under the immediate direction of a despatcher, who has absolute authority throughout his division, it is not clear how freight trains should be unduly favored as compared with passenger trains, except as the despatchers themselves ordered, or at least approved, such favoring.

Where the A B C system has been discontinued, the company has equipped the line from Billings to Livingston, Mont., 116 miles, with automatic block signals. On that part of the line from Cheney to Auburn, 361 miles, the simple manual block system is used. The manual block system will also be used on the line between Paradise and Cheney, 204 miles, when the A B C system is discontinued on that section.

THE BLOCK SYSTEM.

The investigation of block signaling, particularly manual signaling, was begun by the board during the latter part of 1908, and the results were set forth in its last annual report. This work has been continued and extended during the past year, and the results have been briefly summarized and are published as Appendix E to this report. The investigations thus far conducted have not been complete; facilities have been inadequate to permit an exhaustive examination of the problem in all its details. Enough has been learned, however, to make it apparent that the block system, both manual and automatic, on most American railways, is operated far below its maximum efficiency. The most crying present need is reformation in both personnel and methods of operation. For the safe operation of the manual block system, competent and faithful signalmen are absolutely essential. With first-class men, objectionable methods of operation or maintenance may be tolerated without unduly sacrificing safety; but with incompetent or unreliable men even the best methods do not insure safety, no refinement in apparatus or system of rules being sufficient to overcome the weakness due to inexperience, slovenly mental habits, poor training, or lack of proper moral qualities.

The board, in all its preceding reports, has indorsed the recommendation of the commission to the Congress that legislation looking to the compulsory adoption of the block system be enacted. It has not hesitated to do this, because the art of block signaling is well settled. At the present time only about 66,000 miles of railway out of a total of approximately 240,000 miles in this country is operated under the block system, notwithstanding the superabundance of evidence that the system has added immeasurably to safety in railway transportation. The board again urges the recommendation of the commission to

the Congress for compulsory legislation requiring its use as the step of foremost importance in promoting safety in railway operation. Relatively inexpensive and simple block systems can, by proper attention to training and discipline of signalmen, be operated with a high degree of success.

The facility with which the space-interval principle can be adopted and put in use is well illustrated by the action of the Baltimore & Ohio Southwestern in July last, when the line of that company from Storr's, Ohio, westward to Vincennes, Ind., and from North Vernon, Ind., to New Albany, over 180 miles, was equipped with all the necessary apparatus for the operation of the simple manual block system in less than one week. Sixty-two offices were equipped with telegraph instruments and batteries. To facilitate the movement of freight trains waiting on long side tracks where the engine of a waiting train could not be near the station, the B. & O. S. W. put in telephones at the remote ends of these side tracks and connected them to the station office.

AUTOMATIC STOPS.

Since its organization the board has examined plans and specifications of 149 signal and automatic train stop devices. Of this number only 16 purely automatic stop devices have been considered to possess sufficient merit to warrant the board in offering to test satisfactory installations. Only two systems, namely, the Rowell-Potter and the Harrington, have so far been fully tested by the board. The Gray-Thurber and the Warthen systems, as well as those of Electrical Automatic Railroad Safety Signal Company and the Railway Automatic Safety Appliance Company's devices, are now in process of installation, and it is expected that they will be fully tested during the coming winter.

Collisions resulting from the weaknesses in the time interval or train despatching system, and the deficiencies in the block system due to untrained or undisciplined signalmen, as well as errors on the part of enginemen and trainmen, have led to public demand for automatic devices. Many seem to believe that the introduction of the automatic train stop would greatly diminish railway collisions of all classes. While it is true that the use of automatic features in the block system itself, as a result of which block signals are actuated directly by the movements of the train, would greatly diminish the number of collisions due to errors in manual block working, the fact should be clearly borne in mind that the automatic stop corrects but one defect, namely, the failure of the engineman to observe, understand, and obey signal indications. It does not in any way insure that the indications displayed will be correct, nor in any way prevent collisions due to the inherent defects of the despatching system nor to improper working of the block system. This, however, should not be construed as in any way minimizing the importance of the automatic stop, for it is a well-known fact that many accidents have been caused by the failure of enginemen to observe, understand, and obey signal indications. Failures to observe signals may be due to fog, snow, signal light not burning, or smoke from other trains; failure to understand or comprehend the signals may be due to complexity in the system of indications or to diversion of the engineman's attention or to his physical incapacity; failure to obey indications that are seen and comprehended are rare, and comprise only those cases where enginemen desiring to make time are tempted to take chances, or to a too liberal interpretation of rules which allow the enginemen some discretion. Experience with automatic stops show that under proper discipline they perform a moral function in that runners are more careful to heed stop signals when it is certain that disobedience of such signals will be detected.

* * * As both of the stops which have been tested are of the mechanical trip type, there is no information available as to the practical performance of other types of train control systems. These other types include contact rail systems, systems requiring the use of short insulated sections of track and the insulation of certain parts of the engine, and systems making use of induc-

tive or magnetic forces. While the results of the tests on the two mechanical trip devices indicate that their use would materially promote safety in railway operation, the board considers it manifestly improper to make any recommendations concerning the compulsory adoption of automatic train stops based on them alone. Such recommendations should be based on the results obtained from tests of all types of devices believed to offer promise of meeting the varied requirements of railway operation. Some types will meet those requirements in one degree and some in another.

As a result of the recent introduction of automatic stops on some electric roads, and for other reasons, there has been some little development during the past year. One electric surface railway in the State of Washington, the interurban line of the Washington Water Power Company, between Spokane, Cheney and Medical Lake, has put mechanical stops in use on 27 miles of its line. Signal engineers have been studying the subject more generally. With the extension of electric propulsion of trains, the problem of the use of train stops becomes simplified.

On steam railways the only sources of mechanical power usually available are the boilers of the locomotives themselves and the steam plants in the shops of the larger yards. Hence, the installation of signaling systems requiring power for their operation has necessitated the installation of engines and pumps for supplying compressed air, or the installation of primary batteries or electrical generators for supplying electrical current for the operation and control of signals. Power generated chemically in primary batteries is expensive, and the losses incident to the transmission of the energy for operating signals over line wires of considerable length are serious.

The substitution of electric propulsion for steam propulsion on railways provides a readily available source of power for signaling or train controlling apparatus which is continuous throughout the length of the road. The electrical energy for propulsion purposes being generated in large quantities is relatively cheap per unit, and for this reason it is believed that the electrification of steam railways will tend materially to effect an increase in the extent and efficiency of signal installations. To even a greater extent is electrification likely to encourage the use of the automatic train stop by providing available power for the operation of these devices which, it is believed, will in many cases be found to require for their operation more power than the usual forms of fixed visual signals.

Negotiations between the Pennsylvania Company and the Gray-Thurber Automatic Train Control and Signal Company have resulted in an installation of the Gray-Thurber system being undertaken on the westward main passenger track on the Pennsylvania lines, between Jacks Run and R. N. Tower, Glenfield, Pa. It is intended to equip two engines, one running regularly in suburban service, the other running regularly in through passenger service. The New York Central has offered facilities for a test of the train-control system of A. H. Fox, between High Bridge and Yonkers, N. Y., on the Putnam division of that road, and the Washington Water Power Company has installed mechanical automatic stops, as already noted. These installations, encouraged by the railway themselves, are significant, and are in line with suggestions in our last report that the art of automatic train control, like the art of signaling, must be developed by those most intimately concerned in its use; namely, the railways themselves.

The most serious obstacles to the practical development of systems approved for experimental test has been the fact that proprietors have lacked the financial means needed to carry on their work. Large sums of money have been spent in private enterprises to develop devices which have been found to possess little merit. It is a matter of common observation, now as for years past, that devices having no merit succeed in attracting capital by methods scarcely less than fraudulent. Inventive faculty and business ability seldom go hand in hand. * * *

While the board confidently expects the automatic stop to be developed to a point where, like the block signal, the car coupler,

and the train brake, it will be available to railways generally, and in many situations will constitute one of the factors promoting safety in train operation, the board is led to believe from its study of existing conditions, particularly as found in connection with the means now employed for the safe movement of trains, that the primary cause of the lamentable record of collisions in this country is of so serious a nature as not to be susceptible to complete cure by any mechanical means. It is not to be considered that the automatic stop, or that any automatic device, will be a panacea for all the faults at present existing in train operation. The question really is whether by the introduction of automatic devices the percentage of accidents due to those faults can be reduced.

It is an unwelcome thought that the fundamental responsibility for the relatively large number of collisions in this country is chargeable to railway officers and employees; not to them because they are more careless or less sensible of their responsibilities than men in other vocations, for that cannot be truthfully said, but simply because they possess the qualities, mental or temperamental, which are the cause of these deplorable results, and which are symptomatic of characteristics common to all who have been reared in a new and rapidly developing country. But sober reflection leads inevitably to the conclusion that, outside of the army and navy, the American is not reared with that discipline which becomes a part of the man and governs his actions mechanically, as it were, rather than as the result of reasoning. Such discipline leads to action as one's first duty without question or reason, and the sense of duty is the one predominating quality which influences the man's every action unconsciously and unflinchingly. This conclusion is brought home all the more convincingly when one reflects that nowhere in the world have appliances for safeguarding railway transportation been so highly developed as in this country, notwithstanding which nowhere in the world is there a greater proportionate number of accidents of the kind which such advance in the art should prevent. The automatic stop, therefore, while it might be unnecessary under different social conditions, may be expected to add to safety in train operation under the conditions which do exist and must continue to exist in this country until we shall come to appreciate and realize all that may be accomplished by discipline of the right sort. But mere discipline will not suffice alone. There must go with it the spirit which prompts obedience for the pleasure of being approved by one's own conscience.

It being admitted that what is most needed is automatic performance of one's duties rather than automatic mechanical devices, how may it soonest be brought about? The causes that militate against the development of the human machine to perfection of disciplined action are so complex and so interwoven with our social being that many of them can be eradicated only by that slow evolution or growth which results from the operation of natural laws and which can hardly be forced or even guided by the enactment of man-made statutes.

Nevertheless a number of these causes appear susceptible of marked and present improvement. Appeals to conscience may develop a high sense of duty in many men, but the ever-present problem of earning a living, by its very insistence, makes the appeal to self-interest powerful and practical. The pension system as in force on a number of prominent roads and as advocated by the board in its report last year is believed to offer a strong inducement to careful conduct and should be encouraged.

The existence in the regulations of some railway companies of rules that are unfair or non-enforceable, and intended only as an extreme legal precaution to protect the companies, is nearly as bad in its effect upon discipline as the failure of railway officers to rigidly enforce those rules which are proper and necessary to safeguard traffic.

The American Railway Association some years ago prepared, and with painstaking effort has since amended and improved, its standard code of rules governing train operation. It is unable to compel their use or their uniform interpretation and enforcement on individual roads. The causes heretofore mentioned and

others affecting discipline have the bad effect of impelling railway employees to move about from one road to another. This tends to decrease safety in operation by frequently placing men in unfamiliar surroundings; and the condition is made still more undesirable by the lack of uniformity in rules and procedure on different roads. A case where, on a single track railway 150 miles long, used jointly by the trains of three different companies, a system of whistle signals is used on the trains of one company which is entirely different from that used by the other two, is an aggravated example. Legislation in at least one state requires railway companies to file copies of their operating rules with the state railway commission, and makes any infraction of the rules by an officer, agent, or employee a misdemeanor. From this to a federal requirement of the same nature, and, what is more important, enforcing uniformity, is but a short step and one likely to be advocated in the absence of an improvement in railway procedure in this respect.

The law passed by Congress at its last session (public, 165) authorizing the commission to investigate train accidents, should tend to make for better methods and improvement in personnel by directing public attention to those defects and deficiencies which have resulted in train accidents, and thus lead to their correction. But on the theory that prevention is better than cure, it is obviously the part of wisdom to take all practicable measures beforehand to prevent those evils that have heretofore resulted in collisions rather than to wait for the occurrence of accidents to disclose the existence of the evils. Investigations such as the board has been conducting into block-signal and other operating methods, therefore, should be continued and conducted on a larger and more comprehensive scale than has been done in the past. This is necessary, with or without a law requiring the use of the block system.

Again the board desires to express its obligations to the American Railway Association for its co-operation in securing the consent of railways for the installation of apparatus on their tracks for purposes of test, and to the officers of railways who have extended courtesies which have made it possible to conduct practical investigations in the field.

ANNUAL REPORT OF NEW YORK STATE PUBLIC SERVICE COMMISSION, SECOND DISTRICT.

The most important parts of this report from the standpoint of the steam railway officer, are those dealing with locomotive boiler inspection and with grade crossing elimination. Not that the other subjects are not important, but the news concerning them has been given to the public week by week through the year and do not come now so much in the nature of news. The total number of corporations, municipalities and individuals under the supervision of the commission is 944, of which, however, only 77 are active, operating steam railway corporations; and a large portion of the 155 pages of the report is devoted to gas, electric light and other subjects not having to do directly with transportation.

Boilers.—The board continues to supervise the condition of the locomotive boilers of the state through the instrumentality of only two men, an inspector and his assistant; for the state inspection is entirely supervisory except where cases of serious neglect are found. This system results in cordial co-operation between the commission and most of the railways, the commission recognizing that so long as the railways care for the boilers with proper thoroughness, the right and responsibility of inspection rests with the railway officers. The number of boilers to be looked after is 7,900, of which, however, about 1,500 are not in regular service. During the year 367 inspection trips have been made, and the state inspectors have themselves examined 2,649 boilers. They found 725 defective; 193 with too many broken staybolts; 225 with telltale holes in staybolts filled up; 75 defective steam gages; 125 defective water glasses, and 151 defective gage cocks. More defects were found than during the previous year, the inspectors having had more time to devote

to the work. Special attention is being given to breakages of so-called flexible staybolts. On the whole, the inspectors think that the condition of the boilers in the state has been improved during the past year. The number of persons killed and injured in boiler accidents has shown a marked reduction, as follows:

	Killed.	Injured.
In 1908.....	9	28
In 1909.....	6	14
In 1910.....	1	12

All but one of the fatal accidents were due to low water, and the commission intends to investigate every case of low water which results in a failure of the crown sheet. These accidents can be still further reduced by increased care in the maintenance of water glasses, gage glasses, injectors and feed water connections. In most cases of low water the burden of responsibility rests on the engineman, but there have been instances of defective maintenance. Of the 7,900 boilers in the state, the number under ten years of age is 4,775; ten years and under 20 years, 2,221; twenty years and under 30 years, 853; thirty years and under 40 years, 49; forty years and over, 2. The number of new locomotives put in service during the past year was 439—equal to about three times the number put in service in 1909. The commission has found boilers in service carrying too high pressures and proposes to establish the following factors of safety:

Proposed Factors of Safety:

	Boilers now in service.	Boilers placed in service on or after Jan. 1, 1911.
1. Boilers with butt seams, under 30 years, factor.....	3¾	4
2. Boilers with butt seams, 30 to 40 years, factor.....	4¼	4½
3. Boilers with lap and cover seams, under 30 years, factor	4	4¼
4. Boilers with lap and cover seams, 30 to 40 years, factor	4½	4¾
5. Boilers with plain lap seams, under 30 years, factor..	4¼	4½
6. Boilers with plain lap seams, 30 to 40 years, factor..	4¾	5
7. Boilers 41 or more years old to be condemned.		

These figures represent the minimum. The commission would like to see higher factors adopted. By making slight repairs the safety of 500 boilers has been increased during the past year or two; but there still remain 208 locomotives which must be strengthened or withdrawn from service. The commission has conferred with representatives of the Ohio and the Pennsylvania state railroad commissions and those states will probably join New York in the adoption of uniform methods and in the acceptance of each other's inspection reports. The three commissions will arrange for an annual conference.

Crossings.—For grade crossing eliminations the legislature appropriated in 1910 the sum of \$350,000 and for the next fiscal year the commission asks for \$900,000. The amount actually paid out during the past year was \$121,060, which went toward the payment of the state's share for improvements in Niagara Falls, Westfield, Hamburg, Auburn, Rochester, Bethlehem and Huntington. It does not appear that all of these jobs are finished. The number of cases finished during the past year is seven, and in four of these the railway company bore the whole of the expense. The commission has practically approved a large number of eliminations for which there is as yet no appropriation available. The total number of public highway crossings in the state, including those in the first district, is 9,065, and two-thirds of these have no protection. The number of persons killed at crossings in the state in two years and eleven months has been 271, besides large numbers injured. On account of the increase of population and the enormous increase in the use of automobiles, the number of accidents at crossings is constantly increasing. Both of the great political parties have pledged themselves to take action looking to a remedy for this danger, but nevertheless New York has fallen behind other Eastern states. In Vermont each railway must eliminate one crossing for every 80 miles of road annually, the towns and state paying part, and in Connecticut the railway must abolish one for every 60 miles, wholly at its own expense. Many towns and cities are so deeply in debt that they will never take action. The state is building highways at the entire expense of the state, and surely this is no more important than the elimination of grade crossings.

Tariffs.—About 17,000 tariffs have been filed during the past

year, half of which were from steam railways and the rest from express companies, electric roads, etc. The tariffs filed by the express companies show more decreases than increases. Street and interurban roads have made no important changes in local one-way fares, but they are introducing round-trip and sixty-trip tickets. In steam railway freight traffic the commission finds no general advance in rates and there have been innumerable reductions; but changes in classification have produced many increases. The commission has ordered overcharges refunded on freight to the amount of \$11,105.

Steam railway inspection.—The steam railways of the state, 8,160 miles of line, have been inspected during the year. It is found that in track maintenance many roads pursue a temporizing course, spending too much on labor which is partly ineffective because suitable materials are not provided. The ratio of the cost of labor to the total cost of labor and materials varies on different roads from 32 per cent. to 76 per cent. For lack of good ballast or suitable drainage and by reason of other obvious lacks, much labor produces poor results. The commission thinks that probably the state ought to have a dynagraph car so as to more accurately record the quality of the tracks. In the main tracks of the state there are about four million rails, and during the year ending with last June the number broken was 3,885. The railways ought to study carefully to see how much of this breakage is due to imperfections in manufacture, and how much to improper condition of track.

Steam railway equipment has been inspected and particularly with reference to engine failures, spark arresters and ash pans. All of the terminals in which locomotives are housed have been visited. Twelve per cent. of the locomotives of the state were found undergoing repairs or awaiting repairs. A list is given of the defects found in locomotives. In 1909 severe reductions of expenses resulted in insufficient forces in shops and unsatisfactory condition of locomotives, both freight and passenger; but since March, 1910, there has been a decided improvement. In the list of accidents due to defective equipment the principal items are: broken wheels 35; broken axles 18; broken arch bars of trucks 13; defective brake rigging 10, and loose tires 9. In many cases the accidents could have been avoided by more rigid inspection and a higher standard of maintenance. The report indicates that cast iron wheels should be of more suitable design and of better material, but the question of what to do about this seems to be left with the wheel manufacturer and the railways.

For the year ending with October last, the engines of the Boston & Albany failed only once in each 18,000 miles run, which is a great improvement over former records. The records of the Delaware, Lackawanna & Western are also excellent, and the Erie has made notable improvement. The officers of the Erie are putting forth great efforts to reach the highest state of efficiency.

The commission has given careful attention to the enforcement of the law requiring the use in locomotives running through the Adirondack Forest Preserve of some fuel that will not make sparks. The New York Central now has 23 engines burning oil, and the Delaware & Hudson 10. The commission allows the use at night of coal burning engines. A number of coal burning engines have been exempted from the law, but these are carefully watched by the state inspectors. In equipping locomotives and building storage tanks, the New York Central has expended about \$25,000, and the Delaware & Hudson \$8,500. The cost of oil fuel is less than the commission had expected, and the use of oil burners has passed the experimental stage.

Statistics.—The usual statistics are given of the earnings, expenses and traffic of the steam railways which report to the commission. With the statistics of capitalization are summarized the opinions of the commission on the cases which have come before it during the year as to various questions concerning capitalization.

The commission has found its greatest satisfaction in the large number of personal and local grievances which it has been able to settle without formal proceedings.

PHYSICAL VALUATION AND CAPITALIZATION.

Several statements have been published recently in the newspapers and magazines regarding the results of physical valuation in various states. One of these, by Clifford Thorne, one of the counsel for the shippers in the rate advance cases, was prepared to show that these valuations have shown that the railways in the states where valuation have been made are over-capitalized. A careful check of the figures has been made by Prof. Frank Haigh Dixon, of Dartmouth College, chief statistician of the Bureau of Railway Economics, and the following complete statement prepared by him refutes Mr. Thorne's contention:

INTRODUCTION.

An attempt has been made in this study to compare as accurately as possible the physical value and the capitalization of steam railways in the states in which official valuations have been made, that is, in the states of Washington, South Dakota, Michigan, Minnesota and Wisconsin. The state of Texas is considered only casually for reasons which appear in the discussion. It should be noted that in every case the statistics pertaining to value cover only physical properties. No attempt has been made to secure intangible value, which, as a matter of fact, has been arrived at only in one or two instances by state commissions. The omission of intangible value should be held in mind in comparing physical value and capitalization, for it is at least an open question whether intangible value may not properly be capitalized.

The most significant question involved in the method of physical valuation is the manner in which right-of-way and terminal value is obtained; in other words, whether or not the railway is to be allowed a value for its land greater than that of adjoining land, because the railway corporation must settle all damages created by its entry upon private property, and because it frequently must pay an enhanced price for the land which it purchases due to the knowledge on the part of the landowner that the railway must have it at any price. The methods of valuing such land, so far as they could be discovered, are given in the text. It will be observed that Washington, South Dakota, Michigan and Wisconsin make allowance for this added cost in estimating cost of reproduction, and that the Minnesota Railroad Commission, while disapproving the method in principle, has nevertheless had a valuation prepared upon this basis. In this connection, it should be noted that the valuations of both Michigan and Wisconsin were made for taxation purposes.

Assignment of capitalization to the different states has been made upon the single track mileage, that is, upon the road mileage basis. While this is not the most scientific basis, it is the only practicable one which could be employed, for statistics are in most cases not available for an assignment upon any other plan. With a few notable exceptions, the commissions of the different states present only incomplete and undigested statistical matter in their annual reports.

It is necessary to call attention at this point to a matter of technical detail which becomes, in its application, of very considerable importance. Some of those who have already published comparative statements of value and capitalization have made assignments of capitalization to states upon an erroneous basis. It has apparently been the practice to find the ratio of the aggregate mileage within the state to the total mileage of all the systems traversing the state, and then apply this percentage to their total capitalization to determine the state's proportion of capitalization. This method is simple, but it leads to erroneous results, because it applies to a series of different capitalizations an average percentage, which, as a matter of fact, is applicable to no one of them. The only correct method is to determine the capitalization of each road separately on the mileage pro-rate basis, and then add the results together to obtain the aggregate of state capitalization. This latter method has been followed in this presentation.

So many errors have been discovered in the statistical tables

prepared by the state commissions that these reports have not been relied upon in most cases for total mileage or total capitalization. The Statistics of Railways of the Interstate Commerce Commission has been generally used.

In attempting this comparison of physical value and capitalization, many difficulties have arisen which could not be entirely removed.

1. In the first place, when the valuation has been made by a body other than the railway commission, it has been difficult to identify in every case the corporation whose property was valued, and to assign to such corporation its proper capitalization. Roads reporting their capitalization to the commission are as a rule the operating roads, while the roads are valued under their corporate names whether operating or not. Adjustments have in some cases been necessary, but these adjustments have in no case affected the conclusions drawn.

2. As a result of the intercorporate relationships of the various railways, the aggregate capitalization, even within the limits of a single state, contains more or less duplication. This duplication it has been the purpose of this study to eliminate as far as possible. The most striking case which has been encountered is in Minnesota, where not only is the capitalization of the Chicago, Burlington & Quincy included, but at the same time there is embodied the Great Northern's share of the \$215,000,000 bond issue with which the C. B. & Q. stock was purchased. Moreover, in eliminating such duplications, this study has followed the practice of the statistician of the Interstate Commerce Commission, who eliminates collateral trust bonds before computing funded debt per mile for the individual railway corporations. All collateral trust bonds have been eliminated from the aggregate capitalization of the individual road before its stock and bonds have been assigned to the various states. In the same manner, bonds of proprietary companies have been deducted when these proprietary companies appear separately with their own capitalization. A third form of duplication has been corrected by deducting securities held in the treasury. It is evident that securities for which no value has yet been received cannot properly be included in a study which compares capitalization and physical value. Again, securities held in sinking funds have been eliminated from total capitalization. Appropriations to the sinking fund are merely appropriations for the retirement of debt, and the statement that securities are kept alive in a sinking fund is largely a fiction. Finally the total capitalization is increased beyond its proper size for comparison with physical value by the fact that it is frequently issued to cover "other properties" than railways. Railways are frequently engaged in business other than transportation, and no distinction is made between securities issued for transportation and those issued for miscellaneous purposes. So far as it has been possible, capital issues covering "other properties" have been eliminated, but to do this adequately would have required a more extended investigation than was possible at this time. Hence, it is probable that a considerable amount of capitalization is included in the comparative tables which might properly be eliminated because it does not represent railway property. Even with all these deductions there are doubtless other duplications which might be eliminated were a careful study made of the purpose for which capital stock was issued by the various roads, yet it must be clear from the eliminations which have been made that the object is to set up against physical value the securities outstanding in the hands of the public upon which corporations are entitled to earn.

3. It is evident that an allocation of capitalization upon a mileage pro-rate basis is not an accurate figure for a comparative study of this character. It does more than justice to some states, and less than justice to others. A state like South Dakota with most of its mileage single track, and with no valuable terminals gets on a mileage pro-rate far more than its proportion of the capitalization of the roads which operate within its borders, for there is credited to the state a portion of the cap-

italization which belongs to valuable properties located elsewhere. On the other hand, it is possible that the capitalization of the Washington railways should be increased beyond the amount allotted on a mileage pro-rate, if correct results are to be obtained. An illustration of the inaccuracy of this method is found in Wisconsin, where the Illinois Central, with nothing but branch line mileage in the state and no valuable terminals, has its capitalization assigned to the state on a road mile basis. This difficulty is inherent in the situation. It only serves to make clear the proposition that if railways are to be valued at all, they should be valued as units, and not piecemeal by the separate states.

From what has just been said it must be clear that such a comparison is as presented in this study cannot be conclusive. It has been made in the hope that some degree of accuracy might be reached in a subject which has received of late much inaccurate treatment.

WASHINGTON.

The source of information for the valuation of Washington railways is the "Findings of Fact" of the Railroad Commission of Washington, published in 1909. The results of these findings were embodied by J. C. Lawrence, of the Washington commission, in an article in the *Railway Age Gazette* of February 18, 1910, from which the facts here given were derived. Commissioner Lawrence in this article discusses the methods employed in the valuation of Washington railways, and it will be of interest to quote from his discussion before presenting the statistical results:

The cost of reproducing right-of-way and terminals was estimated on the basis of market value of adjacent property, plus the additional amount experience has shown a railway company must pay for consequential damages in securing such property.

The unearned increment was allowed in the cost of reproduction. This may be either in the cost of construction of roadbed, structures and equipment or in the right-of-way and terminals. To fail to allow such increased value would be as unfair to the public as to the railways. Take, for instance, the terminals of an established road in an important city which were acquired at a low value, say, for a million dollars; a new line is constructed and, to acquire its terminals contiguous to and of equal value to that of the established road, pays, say, \$10,000,000. If the latter road were not allowed the value it paid then it would be deprived of a return on the amount actually and necessarily invested in acquiring its property, and in that way deprived of the property itself, for the value of the use of the property is in reality the property itself. If this value were allowed to the latter road and denied to the former, then traffic tributary to the one would have an advantage over the other, and the construction of additional and competing roads would be discouraged.

The commission concluded that on an established road, maintained to a proper standard of efficiency, there would be no continuing depreciation; that on a newly constructed line there would be a rapid depreciation of certain elements during the first few years. This would apply particularly to ties, and, in a lesser degree, to wooden structures and equipment. On the other hand, there would be an appreciation of roadbed on a new line, due to the seasoning and hardening which follows its use, attributable not only to settling of embankments, thus rendering the condition of the roadbed more permanent and safe, but to the necessary labor involved in raising and widening embankments, cleaning out and widening cuts, safeguarding them from slides and remedying the defects occurring in construction and the contingencies which necessarily follow. Such appreciated value of roadbed would largely affect the depreciation in the value of the other items.

The appreciated value of the roadbed was added to the estimated cost of reproduction new, and from this sum deductions were made to cover the depreciation of all other items. * * * But the depreciated value of a road in profitable operation does not equal its market value. To this depreciated value must be added a sufficient amount to cover the enhanced value due to building up a successful transportation business. It is inconceivable that the value of such a business enterprise under efficient management should depreciate from a market standpoint.

In his discussion of "market value" Mr. Lawrence considers such influences as prices of outstanding securities, density of population, amount, permanency and class of traffic, and value of facilities for doing business.

In view of the fact that the Washington commission has not made any statistical summary of its findings, it has been somewhat difficult to determine whether the entire mileage of the state was valued and what was the length of mileage actually included. In a personal letter under date of December 18, 1910, Commissioner Lawrence writes that the valuation included in their "Findings of Fact" of 1909 covers "the railway mileage in existence at the time of the creation of the commission, June, 1905, approximating 3,300 miles. Since that date the mileage has been increased to a little in excess of 5,000 miles and the commission is now engaged in valuing this new construction."

Yet from the tabular summary presented in the article re-

ferred to, the commissioner seems to account for only 3,016 miles, and this figure has been used in presenting the per mile of line valuations in the table below. In view of the fact that the valuation included only the mileage in existence in 1905, it has been necessary to use the 1905 capitalization as a comparative figure. It has not been found possible to present statistics of capitalization for the exact mileage involved in the physical valuation, but the figure employed, 3,167 miles, is no nearly identical that the worth of the comparison is not destroyed.

WASHINGTON—PHYSICAL VALUATION AND CAPITALIZATION.

	Total.	Mileage.	Per mile.
Physical Value (1905-8):			
Cost of reproduction new.....	\$194,057,240	3,016	\$64,343
Present value	175,797,025	3,016	58,288
Market value	195,662,635	3,016	64,875
Capitalization	168,696,670	3,167	53,267

SOUTH DAKOTA.

At the time that this study was made, the report on physical valuation for the state of South Dakota had been completed but had not yet published. Such information as is here given was obtained by correspondence.

In valuing railway lands the commission used the multiple of 250 per cent. as an average, and applied it to all farm and city lands traversed by the roads; that is, it estimated railway land to be worth two and one half times that of adjoining land.

The number of miles valued was 3,953. Although the commission dated its valuation June 30, 1909, it appears that the valuation was begun under an act of 1907, and that much of it had been completed before January 1, 1909. A more accurate comparison of actual conditions would probably have been made had capitalization figures been used for 1908 instead of 1909. However, the 1908 figures have been employed in the case of but one road, the Chicago, Milwaukee & St. Paul of South Dakota, and this was because its intercorporate relationships with the parent company were not fully adjusted on June 30, 1909.

SOUTH DAKOTA—PHYSICAL VALUATION AND CAPITALIZATION.

	Total.	Mileage.	Per mile.
Physical value 1908:			
Cost of reproduction new	\$106,494,503	3,954	\$26,933
Present value	91,695,132	3,954	23,190
Capitalization	138,850,297	3,954	35,116

MICHIGAN.

The original appraisal of the physical properties of Michigan railways was conducted in 1900-01, under the direction of the Board of State Tax Commissioners. Since that time the tax board has annually presented a table of assessed value of railway property, which by law must be an assessment at what the board considers the actual value of the property, that is, a 100 per cent. assessment. The assessed value is doubtless intended to correspond with "present value" as determined by the original valuation. Yet the tax board in its annual presentation of assessed value omits figures of cost of reproduction new, gives no table of mileage valued, but merely the name of each corporation, and gives no indication that a genuine investigation of railway values has been made. This leads to the inference that no valuation of railway property has been attempted in Michigan since the original valuation by Professors Cooley and Adams. It has seemed best, therefore, to include a comparative statement of valuation and capitalization for the year 1900, as well as the incomplete statement for 1907. In cases where capitalization could not be found for corporations listed in the report of the tax commissioners, the assessed value of such corporations has been deducted from the total in order that the statement presented might be properly comparative.

The method of valuing right-of-way and terminal lands is described as follows by Professor Cooley in his report to the Michigan Board of State Tax Commissioners:

The question whether the increased cost of right-of-way over and above the value as determined by contiguous property may properly be included in the present value of a railway, is a matter about which there may be a difference of opinion. The true cash value of a thing has been defined as the price upon which a purchaser and a seller mutually agree, and at which an actual transfer takes place. If an attempt were made to pur-

chase an existing right of way, as, for example, an entrance into a city, if the owner were willing to sell at all he surely would take into consideration what it would cost the purchaser to get into the city by any other route, and the prospective purchaser would surely consider what it would cost him by another route. The conclusion finally reached was to add to the value of the right of way, as determined by contiguous property, an amount fairly representing the additional actual cost to the railroad.

MICHIGAN—PHYSICAL VALUATION AND CAPITALIZATION.

	Total.	Mileage.	Per mile.
Physical value 1900:			
Cost of reproduction new	\$202,716,262	7,813	\$25,946
Present value	166,398,156	7,813	21,298
Capitalization	291,605,232	7,813	37,323
Physical value 1907:			
Present value	204,033,500	8,343	24,456
Capitalization	357,555,907	8,343	42,857

MINNESOTA.

Minnesota has recently completed a most exhaustive physical valuation of railways as of June 30, 1907. This report requires little comment as the very complete statistical presentation explains itself. As already noted, the valuation was made on two different bases, described below as Estimate A and Estimate B. In Estimate A, allowance is made for the price which railways would have to pay for the land for railway purposes, including damages and monopoly prices for land. In Estimate B, land is valued on the same basis as land lying in contiguous territory. The Minnesota commission contended for the valuation represented by Estimate B, the railways maintained that Estimate A was the fairer one. In this connection, reference should be made to the basis employed by the states of Washington, South Dakota, Wisconsin and Michigan.

The capitalization figures are those for June 30, 1907. The considerable reduction in the capitalization figure below that commonly quoted for Minnesota is due to the elimination from the Great Northern's capitalization of \$107,000,000, being its proportion of the Chicago, Burlington & Quincy collateral 4's issued jointly by the Great Northern and the Northern Pacific. In view of the fact that the Chicago, Burlington & Quincy capitalization is already included in the total capitalization of Minnesota railways, it is an obvious duplication to include in the capitalization of the purchasing company any part of the bonds with which the Burlington stock was purchased.

MINNESOTA—PHYSICAL VALUATION AND CAPITALIZATION.*

	Total.	Mileage.	Per mile.
Physical value, 1907, Estimate A:			
Cost of reproduction, new—			
Carrying roads	\$39,299,471	7,577.71	\$52,430
Switching roads	14,435,724	18.72	770,933
Total	411,735,195	7,596.43	54,201
Present value:			
Carrying roads	347,051,336	7,577.71	45,799
Switching roads	13,428,824	18.72	717,160
Total	360,480,160	7,596.43	47,454
Physical value, Estimate B1:			
Cost of reproduction new.....	373,820,141	7,596.43	49,210
Present value	322,565,107	7,596.43	42,463
Physical value, Estimate B2:			
Cost of reproduction, new—			
Carrying roads	350,106,321	7,577.71	46,202
Switching roads	10,855,227	18.72	579,718
Total	360,961,548	7,596.43	47,517
Present value:			
Carrying roads	299,858,186	7,577.71	39,571
Switching roads	9,848,327	18.72	525,945
Total	309,706,513	7,596.43	40,770
Capitalization:			
Carrying roads	292,299,292	7,577.71	38,574
Switching roads	7,728,404	18.72	412,732
Total	\$300,027,696	7,596.43	\$39,496

* Estimate A includes multiples on lands for right-of-way, yards and terminals, and allowance for adaptation and solidification of roadbed. Estimate B1 omits from Estimate A multiples on lands for right-of-way, yards and terminals. Estimate B2 omits from Estimate A multiples on lands for right-of-way, yards and terminals, and allowance for adaptation and solidification of roadbed.

WISCONSIN.

The appraisal of the physical properties of Wisconsin railways is in charge of the Wisconsin Tax Commission, and is made primarily for taxation purposes. The original appraisal was made as of June 30, 1903, and annual revisions thereof have been made through the medium of reports by the railways to the

engineer of the commission. The last report, just received, is dated June 30, 1909.

Concerning the method of valuing right-of-way and terminals, Professor W. D. Taylor, then engineer of the commission, made the following statement in a report to the commission, dated January 2, 1905:

To determine the value of the land in the present right-of-way, such lands must be deemed as belonging to the owners of the adjoining lands and to be acquired by negotiations with such owners or under the power of eminent domain, whereby the owners are entitled to just compensation for the land actually taken and for depreciation in the market value of the residue in consequence of the railway crossing the part taken. In ordinary language, the inquiry will be first, what is the fair average market price per acre for ordinary purposes of the land taken, and second, how much is the depreciation in the salable value of the residue of the parcel, lot, or tract with the buildings thereon from which the right of way is severed. The sum of the two items, first, the market price of the land taken, and the second item, depreciation in the salable market value of the residue, will constitute the right-of-way value.

The figures of total capitalization are those reported by the railways to the Wisconsin Railroad Commission on June 30, 1909. The tax commission has valued a number of private unincorporated roads, which have no capitalization. The valuations of these roads have been omitted from the table presented herewith in order to make the comparison more accurate. The mileage figure used in computing capitalization per mile could not be made to agree exactly with the mileage valued, but the discrepancy of 39 miles is not sufficient to disturb the general conclusions.

WISCONSIN—PHYSICAL VALUATION AND CAPITALIZATION.

	Total.	Mileage.	Per mile.
Physical value 1909:			
Cost of reproduction new	\$296,803,322	7,098.70	\$41,811
Present value	240,718,711	7,098.70	33,910
Capitalization	311,819,128	7,060.00	44,167

TEXAS.

The Texas Railroad Commission estimates the total value of railways in that state up to October 31, 1909, at \$212,794,586, or \$17,198 per mile of line. The aggregate capitalization on June

was an increase in the commission's valuation of Texas roads per mile of line of only 9.3 per cent. That this increase does not at all represent the actual increase in investment in Texas roads is shown by a study of gross earnings. Taking an average of the three years 1894-6 as a base, and comparing this with an average for the three years 1907-9 there is found to be an increase in gross earnings per mile of road in Texas of 71.8 per cent. At the same time, capitalization (stocks and bonds) per mile actually decreased 22.24 per cent. between 1896 and 1909.

Charles S. Potts, professor of law in the University of Texas, in his monograph on Railroad Transportation in Texas, expresses the opinion that if a thorough revaluation were made of Texas roads, the margin between actual value and capitalized value would be wiped out in the case of many roads. He quotes R. A. Thompson, for many years chief engineer of the Texas Railroad Commission, in a hearing before the Interstate Commerce Commission, as asserting it to be his deliberate opinion that the physical property of Texas railways valued by the commission at \$17,000, was worth on an average \$30,000 per mile of line.

It is of interest to observe that the Texas Railroad Commission in its more recent valuations has placed a higher value per mile upon railway property than in its earlier valuations. Between 1894 and 1896, 45 roads with a mileage of 9,105 miles were valued at an average of \$15,589 per mile. Between 1905 and 1909, 37 roads, with a mileage of 16,678 miles, were valued at \$22,227 per mile.

It is significant that the Texas tax board in 1908 estimated the total value of railway property, tangible and intangible, as \$409,957,928, or \$31,776 per mile of line. This board in its estimate includes all those elements of value which are omitted by the railway commission.

For the reasons given, all figures for Texas are excluded as worthless from the summary table at the end of this discussion.

RECAPITULATION.

State.	Physical Value.		Present Value.		Capitalization.	
	Cost of Reproduction.	Per mile.	Total.	Per mile.	Total.	Per mile.
Washington, 1905*	\$194,057,240	\$64,343	\$175,797,025	\$58,288	\$168,696,670	\$53,267
South Dakota, 1908	106,494,503	76,933	91,695,132	23,190	138,850,297	35,116
Michigan, 1900	202,716,262	25,946	166,398,156	21,298	291,605,232	37,323
1907	.....	.....	204,033,500	24,456	357,555,907	42,857
Minnesota, 1907—						
Estimate A	411,735,195	54,201	360,480,160	47,454	300,027,696	39,496
Estimate B 1	373,820,141	49,210	322,565,107	42,463	.....	.....
Estimate B 2	360,961,548	47,517	309,706,514	40,770	.....	.....
Wisconsin, 1909	296,803,322	41,811	240,718,711	33,910	311,819,128	44,167

* In Washington, a market value of \$195,662,635, or \$64,875 per mile, is also given.

30, 1909, including equipment trust obligations and current liabilities, is given as \$420,031,677, or \$31,910 per mile of line. These two totals have often been compared and conclusions have been drawn from them unfavorable to the methods of railway capitalization. Yet a moment's consideration will show that the two totals have no relation to each other whatever. By the stock and bond law of April 8, 1893, the railway commission was instructed to value the property of the various railways as a preliminary to the approval or disapproval of the issue of additional securities. Valuations were made immediately of all roads then in existence, and changes in the aggregate value of Texas railways since that time have occurred only when new lines have been constructed. In other words, the valuation now so frequently quoted was made in 1894-6, when, following the panic of 1893, land, right-of-way, terminal facilities and construction materials were at their lowest prices. To present that original value as the present value of Texas roads, as the commission has done, is to refuse to give the roads any credit for permanent improvements, for the general settling and seasoning of their properties, or for the advance in value due to the general growth of the community to which the railway has largely contributed.

Whatever may have been the degree of overcapitalization in 1894, no comparison of an 1894 valuation with a 1909 capitalization can have the slightest validity. From 1896 to 1909 there

It should be kept clearly in mind by any one who uses the figures given in this pamphlet that this is not, and is not intended to be, a definitive or an absolutely accurate statement of the relation of physical value to capitalization. Its purpose is to point out the difficulties of comparison of these two items within the limits of single states, and to resolve these difficulties so far as available statistics will permit. Further investigation would make possible the production of a multitude of illustrations of the injustice to the railways in most of these western states of the mileage pro-rate method of capital distribution. Although the figures given are those of physical value only, strong arguments might have been advanced for the capitalization of intangible values. But this pamphlet was not designed as a discussion of the principles which should apply in a valuation of railways, nor as an exhaustive discussion of the statistical elements involved.

A line is being constructed from Tacna, Chile, to La Paz, Bolivia. When this line is completed, probably after three years, it will require no more than to link together Tupiza, Bolivia, and Calchagier, Argentine, to establish a through line from Buenos Aires to Tacna, through the South American continent from the Atlantic to the Pacific Ocean, embracing all the ramifications which constitute the Bolivian railway system.

TEST OF SIMPLE ATLANTIC TYPE LOCOMOTIVE ON THE TESTING PLANT AT ALTOONA.

The Pennsylvania Railroad has recently issued Bulletin No. 5, relating to the test of a simple Atlantic type locomotive and a comparison of the results with the test of a 4-cylinder compound Atlantic type locomotive having about the same dimensions of engine, but a somewhat larger boiler. In 1905 this railway published a book of over 700 pages relating to the tests conducted on the testing plant that formed a part of its exhibit at the St. Louis Exposition in 1904. Included in the locomotives tested were four 4-cylinder compound Atlantic type engines. There was not time before the close of the Exposition to make the test of the simple Atlantic type which was included in the program, but it has since been tested on the plant which was removed to and permanently located at Altoona, Pa. The report of the tests of this locomotive is completely illustrated with diagrams and drawings, and contains all essential data similar to the reports for the other locomotives which were published in book form; in addition it gives a comparison of the results with those obtained from the Cole 4-cylinder compound Atlantic type locomotive No. 3000 of the New York Central & Hudson River. This series of tests must be regarded as the most complete and accurate measurements of locomotive performance ever made. Since the publication of the volume covering the St. Louis tests the various data has been used by railway engineers in most European countries, as well as in the United States, as the best available for locomotive boiler and engine efficiency, economy and capacity. Subsequent discussion has shown, as is well known, that there is an important difference in laboratory and road conditions, and for the application of some of this test data it is desirable to know what the ratio is between laboratory and service results. If some of the care taken with laboratory testing were applied to road tests the principal locomotive data might be obtained with greater exactness for service conditions, and this would assist in a further study of these relations and make the laboratory tests of greater value in their application to locomotive performance in actual service.

The completeness and exactness of the work on the locomotive testing plant at Altoona suggests that it would be profitable for railways and locomotive companies to club together and have a series of tests equally complete made of a Mallet locomotive. There are a number of uncertainties connected with the operation of these locomotives, and if their characteristics were as well understood as those of the Atlantic type there would probably be a considerable modification in the design of Mallet locomotives.

The information and data contained in the report of the tests of the simple Atlantic type locomotive is so valuable that we give some of the principal figures and conclusions. The general dimensions of the Pennsylvania simple Atlantic type engine are: Cylinders, 20½ in. x 26 in.; drivers, 80 in.; weight on drivers, 110,000 lbs.; there are 315 two-inch tubes each 15 ft. long; fire-box heating surface, 156.86 sq. ft.; tube heating surface, 2162.4 sq. ft.; total heating surface, 2319.26 sq. ft.; grate area, 55.5 sq. ft. The Cole compound, No. 3000, with which this engine was compared, is an engine of nearly the same capacity and the weight on drivers is identical. The principal difference is in the heating surface and grate area, the Pennsylvania engine having 732 sq. ft. less heating surface and 5.6 sq. ft. more of grate area. The ratio of heating surface to grate area in the New York Central engine is 61, and in the Pennsylvania engine 41.8. The coal used in the Altoona tests was from the same mine as that used at St. Louis, and the average analysis is very nearly the same. That used at Altoona was: Fixed carbon, 76.25 per cent.; volatile combustible, 16.13 per cent.; moisture, 1.6 per cent.; ash, 6.02 per cent.; total, 100 per cent.; sulphur, determined separately, .94; B. T. U. per pound of coal, 15,143.

One of the interesting features of the boiler performance was the measurement of the limit of its capacity. Starting with the evaporation of about 15,000 lbs. per hour the rates were advanced

by fairly even stages until an evaporation of 30,000 lbs. was obtained. When this latter figure was exceeded the steam pressure could not be maintained, and it was concluded that the boiler could not be expected to deliver more than a maximum of 30,000 lbs. of steam per hour. This was obtained at 160 revolutions, or 38.2 miles per hour, and corresponds to 16 lbs. equivalent evaporation per square foot of heating surface. The quality of the steam with the boiler working at maximum capacity was about 98.5 per cent., or practically dry, and this indicates that there is not a much greater amount of moisture present in steam when the boiler is delivering large quantities than when the evaporation is low.

Basing the boiler horsepower on an equivalent evaporation of 34.5 lbs. of water per horse power hour, the range of the power in tests was 500 to 1,000 boiler horsepower. The maximum was at the rate of .43 h. p. per square foot of heating surface, or 2.32 sq. ft. heating surface per horsepower, and 18 h. p. per square foot of grate surface. The equivalent evaporation per pound of coal ranged from 10.69 lb. obtained at the lower rates of combustion, to a minimum of 5.74 lb. at the higher rates of coal consumption per square foot of grate. The efficiency of the boiler also varied with the rates of combustion, being 67.65 at the lower rates and 42.41 at the higher rates.

In discussing the engine performance the report calls attention to the indicator diagrams, and states that the tests at different speeds while running with the reverse lever in the same notch did not have the same actual cut-off in the cylinders, but it became longer as the speed increased, probably due to the springing of the valve motion. This effect was so marked that the cut-off was found to increase from 15.7 per cent. at 80 revolutions per minute to 21.4 at 320 revolutions per minute, while the reverse lever notch remained the same. Steam consumption decreased as the indicated horsepower increased, while the best result was 23.8 lbs. of dry steam per indicated horsepower.

During this test the driving axle bearings were lubricated with oil; the main side rods, except the front end of the main rod, were lubricated with hard grease, and the cylinders with oil by sight feed lubricators. The machine friction was found to be fairly uniform, and the average has been taken as equivalent to 1,687 lbs. drawbar pull. The maximum horsepower of the engine, 1,250, was obtained at 280 revolutions. The drawbar pull and steam consumption corresponding to different speeds are given in the following table:

Nominal speed, r. p. m.	Steam per I. H. P. hour, lbs.	Maximum cylinder horsepower.	Maximum estimated drawbar pull, lbs.
80	32.3	940	16,768
120	28.0	1,075	12,384
160	26.3	1,150	9,602
200	24.9	1,220	7,894
240	24.4	1,240	6,428
280	24.0	1,250	5,325

COMPARISON OF SIMPLE AND COMPOUND ATLANTIC TYPE PASSENGER LOCOMOTIVES.

In the comparison of the results of the tests of the Pennsylvania Atlantic type locomotive and the New York Central 4-cylinder compound Atlantic type locomotive, the former will be known as engine No. 5266 and the latter as engine No. 3000. The equivalent evaporation per pound of dry coal for different rates per square foot of heating surface shows no difference in the two boilers. In other words, the efficiency of a square foot of heating surface in the boiler of No. 5266 was the same as the efficiency of a square foot of heating surface in the boiler of No. 3000, and this was true for all rates of evaporation. When, however, the equivalent evaporation per pound of coal is plotted according to the rate of combustion, the advantage of the larger heating surface per foot of grate in No. 3000 is at once apparent, and this advantage in economical evaporation is maintained throughout the full range of steam delivery of the two boilers. The greatest loss due to poor combustion as indicated by carbonic oxide was only 1¼ per cent., with No. 3000, which is remarkably low; while in the case of No. 5266 in one case it was 9.13 per cent., and in two others 6 per cent. and 7.3 per cent. The more

perfect combustion shown in No. 3000 is in all probability due to the brick arch, as there was no arch in No. 5266.

The most interesting figures in this comparison of simple and compound passenger engines are shown in the engine performances, and especially in the relative steam consumption. The compound locomotive within certain limits operates on less steam per unit of power than the simple locomotive. The data and diagrams from these tests show clearly another fact that is not so generally recognized, and that is that the difference in the water rate or steam per horsepower hour is not a constant difference expressible as a certain definite percentage of saving. When each of the locomotives was developing 600 h.p. there was a difference in the steam per horsepower of about 9.7 lbs., or a saving of 31.8 per cent., while at 1,300 h.p. this saving was but 3.5 lbs., or about 14.9 per cent. The diagrams show that the water rates of the two locomotives would perhaps meet at about 1,600 h.p., were it possible to drive No. 5266 to such a point, and as the high horsepower is obtained as a rule at the higher speeds, the curves would indicate that the simple locomotive was working most economically at its highest speed, while the reverse is true of the compound. The conclusion in regard to steam consumption at different speeds as given in the book on the St. Louis tests is as follows: In general, the steam consumption of the simple engines decreased with increased speed, while that of the compounds increased, which would lead to the conclusion that the steam distribution of the compound was less satisfactory at high speeds than that of the simple.

It would appear at first sight that the curves for coal per indicated horsepower should follow the same law as those for steam, and this would be the case were it not for the fact that as the output of the boiler increases it is at the expense of a greater and greater quantity of coal per pound of water evaporated. While no advantage of the compound is shown at high speeds, one of the most significant results of this comparison is the large increase in horsepower and drawbar pull that may be realized from compounding, without any increase in boiler capacity. This is an important advantage aside from all consideration of economy in the use of fuel. If the simple engine working its boiler to nearly maximum capacity produces 30,000 lbs. of dry steam per hour, it could develop 1,200 h.p., while the compound with the same amount of steam will develop 1,400 indicated h.p. When this is converted into drawbar pull, there is an increased drawbar pull from the compound engine of 1,600 lbs. at 40 miles per hour, 1,184 lbs. at 50 miles per hour, and 962 lbs. at 60 miles per hour. At the last speed the total drawbar pull of the simple engine is 5,775 lbs., and that of the compound engine 6,737 lbs. The bulletin contains complete drawings of the simple Atlantic locomotives and an abundance of tables and diagrams showing the graphic log of every test.

On November 3 the Antung-Chikuanshan section of the Atung-Mukden Railway, Manchuria, was opened to standard gage traffic. The section is 50 miles long—about 26 per cent. of the present line. As there are already 35 miles of broad gage line at the Mukden end of the railway, and the whole line when finished is to be 170 miles, the work of reconstruction is therefore about half finished. The center section, now 103 miles in length, will, when finished, be only 85 miles, the distance through the mountainous region to be reduced to that extent by tunneling. The total length of these tunnels will be 25,000 ft.; the longest will be 4,884 ft. It is expected that the entire line will be completed by August of next year. American rolling stock is to be used on the new line, while the rails and ties are of Japanese make. The secretary of the South Manchuria Railway says that the bridges were ordered from the United States because American manufacturers were able to supply them within the shortest time. The total length of bridges is 20,000 ft., the longest bridge being 1,830 ft. The widening of the gage between Antung and Chikuanshan has materially shortened the trip between Antung and Mukden.

FEDERAL BOILER INSPECTION BILL.

The bill for regulating the inspection of locomotive boilers, which has been before Congress for the past year and which has been subjected to much discussion and many amendments, has finally been put into such shape that neither the railways nor the employees' brotherhoods make serious objection to it, and in this shape it passed the Senate on January 10. It is now in the House Committee and it may become a law at the present session. The following is the substance of a bill as passed by the Senate:

Section 1. Applies to all interstate railways.

Section 2. From July 1, 1911, it shall be unlawful to use any steam locomotive in moving interstate traffic unless the boiler and appurtenances are in proper and safe condition to move traffic without unnecessary peril to life or limb; and all boilers shall be inspected [by the roads], in accordance with rules to be prescribed, and be able to withstand tests provided by such rules.

Section 3. The President, by and with the advice and consent of the Senate, is to appoint a chief inspector of locomotive boilers (salary \$4,000) and two assistant chief inspectors (salary \$3,000 each). [These three inspectors seem to be independent of the Interstate Commerce Commission, but all of the other provisions of the bill refer to the commission as the ruling authority.]

Section 4. The chief inspector is to divide the country into 50 districts, and an inspector is to be appointed for each district; salary \$1,800, with \$600 for office rent, stationery and clerical assistance. These 50 inspectors are to be appointed by the Interstate Commerce Commission after competitive examinations, according to the rules of the Civil Service Commission. The chief inspector is to prepare a list of questions, which, when approved by the Interstate Commerce Commission, is to be used by the Civil Service Commission as a part of its examination.

Section 5. Each carrier shall file its boiler inspection rules, which, after hearing and approval by the commission, shall become obligatory on such carrier. If the rules are not duly filed, the chief inspector shall prepare rules for that carrier. A carrier may change its rules from time to time, on approval by the Interstate Commerce Commission. The general rules for the inspectors are to be prepared by the chief inspector and approved by the commission.

Section 6. Each inspector is to become familiar, so far as practicable, with the boilers in his district; and make personal inspections from time to time as may be necessary to carry out the law and as may be consistent with his other duties. His first duty shall be to see that the carriers obey the law and repair defects promptly. Each carrier must send to the inspector duplicate sworn reports of each inspection and also of what has been done to repair defects found by inspection. An inspector finding a boiler out of order is to notify the carrier in writing and thereafter the boiler must not be used until repaired. Within five days the carrier may appeal to the chief inspector for re-examination and another man must then re-examine, within 15 days; if still dissatisfied, the carrier may within 30 days appeal to the commission, which may overrule the inspector or the chief inspector. Pending either appeal, the inspector's first decision shall stand.

Section 7. The chief inspector shall make an annual report to the commission.

Section 8. Boiler accidents resulting in serious injury or death must be forthwith reported in writing and the chief inspector shall investigate or order investigation. Parts of damaged boilers must be kept so that they can be seen by the inspectors. The commission may at any time call on the chief inspector for a report of any accident and may publish the same with recommendations. Such reports must not be used as evidence in suits for damages.

Section 9. Penalty for violation \$100.

Two new stations, Luque and Kilometro 35, have been opened on the Central Argentine Railway's branch from Villa del Rosario to Las Rosas.

WOOD PRESERVERS' ASSOCIATION.

The seventh annual meeting of the Wood Preservers' Association was held in the Auditorium Hotel, Chicago, January 17-19. The first session, devoted to routine business, was called to order at 10 o'clock Tuesday morning by President Walter Buehler, with about 40 members and guests present. The report of F. J. Augin, secretary-treasurer, showed a balance on hand of \$457.60 and a membership of 66. The convention held sessions on Tuesday afternoon, Wednesday morning and afternoon for the discussion of papers.

The feasibility of grouping timbers for treatment was discussed by W. F. Goltra, president, W. F. Goltra Tie Co. [This paper will be published later.]

A general review of timber treating in this country was presented by John T. Logan, president, National Lumber & Creosoting Co. He spoke of the progress made in wood preserving on American railways and mentioned the factors which are most retarding the growth of such preservative work. The most important of these factors are, that many railway managers are compelled to curtail expenditures, that many who believe in wood preservation, try so many new methods that the impression is given that the entire process is still in the experimental stage, and that many "get-rich-quick" companies are producing worthless treated timber products that reflect on the quality of all properly treated timber.

F. J. Angier, timber treating engineer, The Kettle River Company, and consulting timber treating engineer, Chicago, Burlington & Quincy, summarized the results that have been obtained in this country in prolonging the life of railway cross ties by preservative treatment as shown by the records that have been kept. The results given were limited by the subject assigned to those shown by records which have been kept, and the writer brought out the fact that in most cases much more valuable data than that preserved in permanent records could be obtained by relying on the memories of men who for many years have made a study of the life of timber. To illustrate the unreliability of records, one case was cited in which a railway company kept a tie record for ten years and the results showed that only 102,000 ties out of a total of more than five and a half million—less than 2 per cent.—were shown as removed for all causes. However, some of which the following is part:

The general average of the life of white oak ties (not treated) reported by twenty-two well-known railways of the northern states, located both east and west of the Allegheny mountains, is eight and one-fourth years, according to a report made by the American Railway Engineering & Maintenance of Way Association. The figures taken into account in this average were supposed to represent the life of ties which had failed by natural decay and not by rail cutting. In the southern states the life of white oak ties is said to average five or six years.

W. L. Breckinridge, of the C., B. & Q., says the average life of untreated white oak ties on that road is ten years; white pine is about five years. He further says that about 90 per cent. of all their untreated ties fail account of decay.

The Atchison, Topeka & Santa Fe has kept a tie record, which shows an average life of about ten and one-half years.

A statement taken from the Chicago & Eastern Illinois's records, made December 31, 1909, shows only 9½ per cent. removed, account of decay, from a total of 111,816 ties treated in the year 1899. From a total of 1,647,605 ties laid during the years 1899 to 1909 inclusive, the records show only 1.1 per cent. removed due to decay. This record was made by placing a dating nail in each tie as treated and laid, and depending upon the section foreman to hand in correct reports of ties put in and taken out of track. It has proven a very

unsatisfactory method of keeping a record and doubtless many inaccuracies occur.

A committee that investigated the treated ties on the Illinois Central reported that red oak, gum and beech, treated with zinc-chloride will last at least double that of white oak ties in the south, and equally as long as white oak in the north; and that the percentage of failures so far found is less than white oak in all localities.

The following is taken from a paper written by C. T. Barnum, appearing in the Journal of the Western Society of Engineers for June, 1910:

"The L. & N. in 1882 used large quantities of creosoted piles, stringers and caps, in the construction of trestles and docks, in the vicinity of Pensacola, Fla. All of this material gave a service of over twenty-five years.

"The Forest Service has estimated that proper preservative treatment will increase the life of ties over 200 per cent., poles 100 per cent., posts 300 per cent., piles 700 per cent., mine props 400 per cent. and lumber 300 per cent."

Octave Chanute said that with the German practice of injecting about one-third of a pound of zinc-chloride in a cubic foot of timber, he obtained an average life of eleven and one-half years with hemlock and tamarack ties.

October 1, 1900, 550 red oak ties, treated with one-third pound of zinc-chloride per cubic foot (in this case solution was made of such strength that treatment was carried to point of refusal) were placed in track near Mystic, South Dakota, on the C., B. & Q. These ties were inspected by J. H. Waterman on October 9, 1910, after ten years' service. Mr. Waterman says: "Not one tie has been removed for any cause. The rail has been changed once or twice. The ties are laid on a 3 per cent. grade and a 12 degree curve. From the surface appearance they will last at least five years more, and I will be disappointed if 50 per cent. are not in track ten years from this date."

The climate around Mystic is comparatively dry; and further, the ballast in which the ties were imbedded is limestone, which in itself absorbs more or less moisture and thus affords protection to the ties.

April 17, 1894, sixty hackberry ties were laid in track just west of Gillette, Wyo., on the C., B. & Q. They were treated with zinc-chloride by the Santa Fe and shipped to the Burlington. A careful record has been kept of these ties, and they were last inspected by Mr. Waterman October 6, 1910. He says:

"Originally there were sixty ties placed in track. Twenty-five per cent. are still in track and apparently in a good state of preservation. They have been in track now over sixteen years."

This is another case of ideal climatic conditions. If these same ties were placed in track in Illinois or in Texas the results would have been altogether different in all probability.

The Committee on Wood Preservation of the American Railway Engineering & Maintenance of Way Association, in their 1909 report, gave the following preliminary deductions:

(1) "Creosoting may be relied upon to preserve piles from twenty to twenty-five or more years, if they are injected with 16 to 24 pounds per cubic foot.

(2) "Creosoting at present cannot be relied upon to preserve ties more than fifteen and one-half to nineteen years, an absolute maximum, unless the ties are protected against mechanical destruction. If badly injected they perish from decay in five to twelve years.

(3) "Burnettizing, when well done, can be relied upon to preserve ties from ten to fourteen years. The amount of injection varies with the proposed subsequent exposure. In arid climates one-quarter pound of dry zinc-chloride per cubic foot may give good results. In moist and warm climates not less than one-half pound per cubic foot should be in-

jected. There are great differences in the thoroughness with which the work can be done.

(4) "The zinc-creosote process has been too recently introduced (1904) in this country to give definite conclusions; it has given ties a life of twelve to eighteen years in the track in Germany."

In another report this same committee says that untreated white oak ties last seven to twelve years, pine five to eight years, chestnut eight and one-half years, cedar fifteen years, tamarack five to six years, hemlock five years, cypress seven to nine years, 75 to 98 per cent. of white oak ties fail from decay, and 2 to 25 per cent. from rail and spike cutting; 75 to 90 per cent. of other ties fail from decay, and 10 to 25 per cent. from rail and spike cutting.

W. A. Clark, chief engineer of the Duluth & Iron Range, says: "In the fall of 1890 we placed in our main track 256 ties, of which eighty-five were white pine, eighty-five tamarack and eighty-six red Norway, all treated by what I understand was the Wellhouse process. The track in which they were placed was at the time single track, but the road was shortly afterward double-tracked and the grade at this point revised so that many of the ties were damaged and could not be used over again at that time. After double-tracking, these ties were in our north-bound track, which carries our light trains to the mining districts. A few of these ties were only removed the past season, but nearly all of them had been removed by 1908. We estimate that the average life of the ties which were not damaged when the double-tracking was done was about fifteen years. I might add that the ties had been seasoned since the winter previous before treating, and they were laid in gravel ballast, which is frozen solid probably an average of five months in the year, which might account for part of their long life."

In closing the paper Mr. Angier outlined the system of keeping a tie record which he developed for the Chicago, Burlington & Quincy, and which was described in the *Railway Age Gazette* of May 6, 1910, page 1124. He shows that this system of keeping a record on 19 divisions laid with ties of varying grades and treated by different systems has proved very satisfactory and has decreased the cost of such records by about \$75,000 in ten years plus the interest on that amount.

H. J. Whitmore took up the matter of treating sawn and hewn ties in the same cylinder load. He advocated separate treatments, and in defense of this position brought out the points that timber from which sawn ties are usually cut is, as a rule, of a better grade than that from which hewn ties are cut; that the hewn ties are usually seasoned on line while the sawn ties usually come direct from the mill and are, as a rule, green and not ready for treatment; that the two classes of ties should be kept separate in the track for various reasons, which would require a separation at some time during the handling; and, finally, that the treatment can better be controlled when the two classes are separated.

The covering of retorts was very strongly advocated by R. W. Yarbrough, superintendent National Lumber & Creosoting Co. He assumed a set of conditions and calculated the financial saving directly resulting from using covered retorts. His figures are given below:

I have taken a 7-ft. retort, 132 ft. long and operating under 250 degs. of heat, eight hours a day. If you are not steaming and carry your oil at 150 degs. my figures will be reduced one-half. I have taken the outside temperature to be 60 degs.

The cylinder will have 2,972.68 sq. ft. of surface exposed to radiation. The best authorities give 2.23 B. t. u. lost per sq. ft. per hour for every degree of temperature. We have 250 degs. in retort, outside temperature of 60 degs., leaving a difference in temperature of 190 degs. Take this 190 degs. times 2,972.68 sq. ft. of surface exposed times 2.23 B. t. u.

lost for every degree of heat per sq. ft. and we have 1,237,023.37 lost every hour. This only represents the theoretical loss, as in generating this heat from coal and transmitting it in the form of steam is lost 40 per cent. of the calorific power of the coal. Add this 40 per cent. to the 1,237,023.37 B. t. u. lost in retort and we have lost 2,061,705 B. t. u., of heat in one hour. The next thing is to see how many pounds of coal this amounts to. A fair average of the heating value of our coal is 11,000 B. t. u. a pound. Divide this into the 2,061,705 B. t. u. lost in retort and the result will be 187 pounds of coal, which has been burned and for which no useful work has been done. This coal, we will say, is costing \$3 per ton at fire room. I will assume we have lost 13 more pounds before it gets to retort, making a total of 200 pounds of coal lost from radiation. This is one-tenth of a ton at \$3 per ton, which makes 30 cents for every hour. This, multiplied by eight hours, means a loss of \$2.40 worth of coal in eight hours. If we run 300 days out of a year, we have lost \$720 for want of retort covering.

Having shown the loss of money by not covering retorts, let us see what it costs to cover same, and whether it pays. I will say that it costs \$1,000 to cover the retort. That can be cut in two if a cheaper covering is used. This \$1,000 cost will represent an interest charge of 31 cents per day. This taken from the \$2.40 saved by covering, leaves a net saving of \$2.09 a day. There is another big saving in having retorts covered, and that is, that after you once get them hot, it is very little trouble to keep them that way. That is well recognized by all good operators, and they always strive to change charges as rapidly as possible so as to keep retort.

In commenting on the difficulties met by northern treating plants that are not met in the south, Andrew Gibson, superintendent timber preservation and tie treating plants Northern Pacific, mentioned the following facts: Northern plants must invariably contend with very cold weather at frequent periods between the first of November and the end of March, which, of course, means increased coal consumption and increased care to guard against freezing pipes and consequent damage to plants. During the same period the snow, which is common in the northern states, makes the handling of cylinder cars in the yards very troublesome. The opinion was also expressed that Douglas fir, tamarack and spruce are more refractory to treatment than the average southern woods. The writer mentioned the fact that a great deal of the material consumed in timber treating is imported, and that the northern plants, which are far removed from the coast, have to pay an added amount for the extra freight haul.

William Townsley, Jr., the Grasselli Chemical Company, read a paper on the benefit derived by members from attending the conventions of the Association. The convention closed with a business session Thursday morning. The election of officers for the coming year and the matter of affecting the incorporation of the association were to be taken up at this meeting. Further announcement of this meeting will be given in the *Railway Age Gazette* of next week.

The subject of depth of penetration that can be expected with the amount of preservative usually specified was discussed by R. L. Allardyce, superintendent International Creosoting & Construction Co., and David Allerton, The Kettle River Co. Mr. Allerton brought out the fact that the amount of penetration to the cubic foot depends on the relative dimensions of the stick of timber treated and that the density of the solution used must be taken into account in considering the effectiveness of any penetration. For creosote treatment he gave the following average values for penetrations, which may be expected under ordinary conditions: With a 10-lb. treatment in piling a penetration of 1½ in.; with a 12-lb. treatment in bridge stringers and caps, 1½ in. It is evident that to obtain the same penetration the amount of oil used must be increased as the surface per cubic foot increases. The writer suggests that this increase be made in a

simple arithmetical ratio to the increase in surface. Mr. Allardyce confined his statements to the treatment of southern pines by the full cell method. He gave as average values for piling on a 10-lb. to 12-lb. oil treatment penetrations of $\frac{3}{4}$ in. to $1\frac{1}{2}$ in.; on 14-lb. to 16-lb. treatment, $1\frac{1}{2}$ in. to 3 in.; on a 20-lb. treatment, $3\frac{1}{2}$ in. to 4 in.; and on the heaviest treatments, 22 lbs. to 24 lbs., from $4\frac{1}{2}$ in. to complete penetration. For treating ties by the straight zinc or Burnettizing process, a 20-lb. treatment on loblolly ties should give a complete penetration, or, at least, up to the last inch or inch and a half of the center of the tie.

C. D. Chanute, of O. Chanute & Company, took up the subject, which was rather fully discussed at last year's convention, concerning the amount of creosote oil that can be withdrawn from wood by subsequent vacuum. The writer submitted the following results of tests:

Some thoroughly dried ties were weighed carefully and then put in the cylinder and the door tightly closed. The cylinder had a capacity of three ties, and on top of the cylinder at the highest end (as the cylinder was on a slight slant), there was connected a small pipe extending about a foot above the cylinder, so that when filling, the fact that the cylinder was absolutely filled could be ascertained, as the creosote was allowed to flow into the cylinder until it came out of this pipe in a solid, liquid stream,

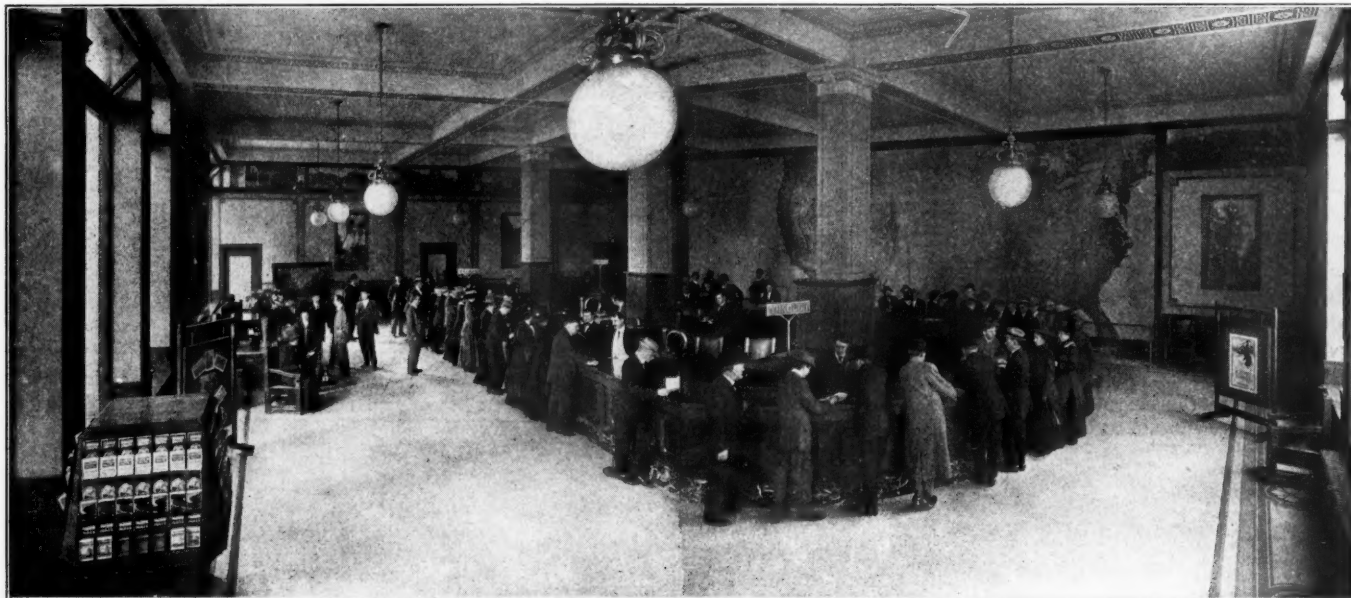
After this vacuum, air was admitted to the cylinder, and the oil extracted allowed to run through the small pipe under the cylinder, caught and weighed. The ties were removed from the cylinder and weighed, being again set in the tin troughs which had been cleaned of the former drippings. The drippings from the cylinder, and the drippings in the troughs, were weighed to check the weight of the ties after the vacuum, and the following results were obtained:

Out of experiments with 12 different ties the results varied from 8.1 per cent. of creosote extracted from planed Loblolly pine to 22.4 per cent. extracted from sawed Loblolly pine.

The writer performed some experiments along this line about 15 years ago, that is, the extraction by vacuum, and obtained about the same results, which seem to show that from 5 to 15 per cent. can be extracted by subsequent vacuum.

SOUTHERN PACIFIC TICKET OFFICE, PALACE HOTEL, SAN FRANCISCO.

The Southern Pacific has opened in the Palace hotel building, 633 Market street, San Francisco, a ticket office, which, for convenience of arrangement, general adaptability to the purpose of a ticket office and beauty of furnishing and decoration, ranks among



General View of Southern Pacific Ticket Office.

showing that there was no foam or air left in the cylinder, after which the valve just above the top of the cylinder was closed.

The cylinder was filled entirely by gravity, no vacuum being produced before filling, and the creosote was allowed to enter the cylinder very gradually so as to produce as little foam as possible. There was also a small pipe connected with the bottom of the cylinder at the lowest point, which was used to catch all drippings, as the cylinder was on a slight slant, as before mentioned.

After filling, a pressure of 100 lbs. per sq. in. was applied for three hours, and steam circulated in the steam coil, keeping the temperature at 180 degs. Fahrenheit. The creosote was then withdrawn as completely as possible, and the ties immediately taken out and weighed, being set in tin troughs on the scales which would catch all drippings, and then allowed to stand in the air for one hour, still in the tin trough, after which the ties were reweighed, and the drippings in the troughs and the drippings from the cylinder after the ties were removed, were weighed, so as to check the drippings of the ties. In all cases this checked very closely. The ties were then returned to the cylinder and heated to the same temperature as before removal, and a vacuum of 25 in. applied for one hour, and this vacuum was obtained in about three minutes, due to the small capacity of the cylinder.

the finest ticket offices in the country, if, indeed, it is not the very finest. The new ticket office is conducted in addition to the city ticket office in the Flood building, with entrances on both Market and Powell streets.

The office in the Palace hotel has 3,500 sq. ft. of floor space, 50 ft. being on Market street and 70 ft. on New Montgomery street. The entire scheme of arrangement and decoration is novel. The woodwork is Circassian walnut. A large circular counter, 142 ft. long, occupies the center of the room, as shown in the illustration. In the lobby are large tables and comfortable chairs for the convenience of patrons in writing letters, telephoning, etc. On the walls are numerous large photographs picturing the wonders of California, and a frieze runs entirely around the room showing Lake Tahoe, the Sierras, the missions of California, Mount Shasta, Riverside, etc. The most striking feature of the decorative scheme, however, is an immense map of the United States, painted on the western wall of the room. It is 18 ft. high and 52 ft. long., being $6\frac{1}{4}$ miles to the inch. It took three artists over six months to paint it.

A new feature has been introduced in the making up of interline tickets. Local and Pullman tickets are kept in cases on the main floor, but the interline ticket cases are in the basement,



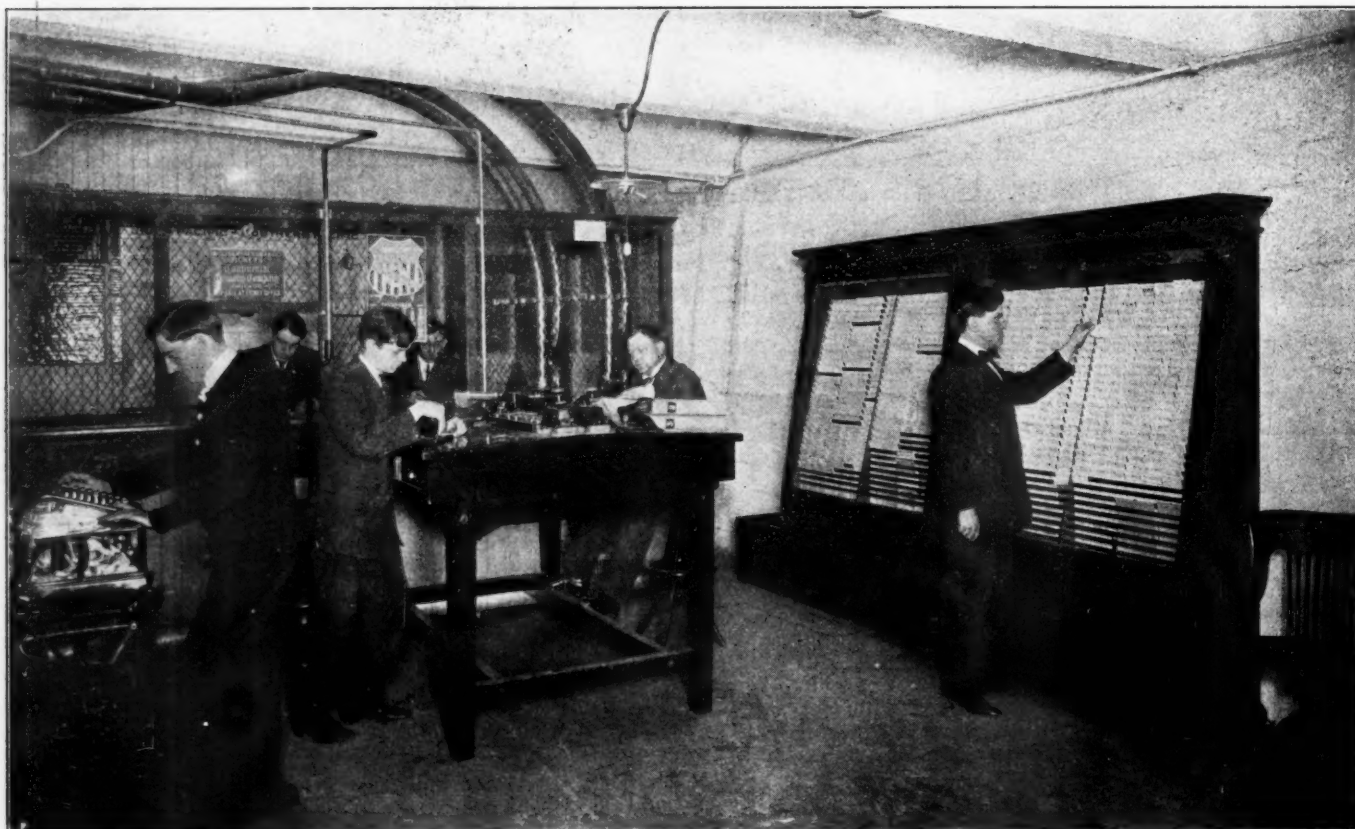
Booklet Stand.

where there is a force of ticket makers. Under the arrangement in effect, the man behind the counter becomes a salesman only, and devotes his entire attention to the traveling public. When the passenger decided on his route a slip similar to the one illustrated herewith is made out by the salesman and sent by pneumatic tube to the basement, where the ticket is made up by



Writing Tables for Customers.

ticket makers who have nothing to but devote their time to this work. As soon as it is prepared, it is sent by pneumatic tube



Ticket-Making Room.

to the main floor. This arrangement has the usual advantages of division of labor where such division is feasible. It makes it practicable to prepare the tickets more quickly than where the salesman has to do it, because under this arrangement the ticket maker does not have his work interrupted by passengers asking questions. It is further advantageous in that it enables the salesman to devote his entire time and attention to the customer, which makes it sure that the latter will be well and tactfully served.

IMPROVEMENT IN SIGNAL DETAILS.*

BY J. S. HOBSON,

Assistant General Manager, Union Switch and Signal Company.

The progress made in our branch of engineering during the past year has been along the lines of developing designs already in general use.

The interlocking and signaling for the new terminal of the Pennsylvania Railroad in New York City is a striking example of this, since, while that installation is the very latest development in railway signaling, it differs little in general principles from similar plants installed during the past five years. The most noteworthy features of this installation comprise means for obtaining the positive control of interlocked signals by the actual position of the switches or switch they govern; the automatic control of such signals by track conditions; the automatic locking of all switches in every route by the entrance of trains thereon, and their automatic release immediately the rear end of a train has passed clear of the fouling point of the track including each switch. The special features further comprise means for giving visual indications to the tower operator of every act of a train in actually locking and releasing levers controlling switch and signal operation, and means for permitting the joint use of all tracks for traffic in either direction between adjacent towers, by the co-action of towermen and track conditions.

There is one somewhat original improvement used here for the first time to any extent; namely, the control of electro-pneumatic valves through magnets actuated by alternating current. The use of alternating current for the operation of signal apparatus has been steadily growing for the past seven years, and the twelve-month just passed represents a more rapid growth of its use than any previous year. Alternating current was first used to any extent in signal apparatus for the operation of track circuits on electric railways, employing either alternating or direct current for propulsion purposes, but now its use has gradually been extended to the operation of signals, indicators, and locks.

A new field has very lately been opened for signal apparatus on interurban electric railways, the managers of which are taking a very keen interest in this subject, several contracts of this kind having just been closed by this company. On these roads, by modifications in the design of alternating-current relays, transformers, etc., the length of track circuits which can be operated without relaying has been materially increased, and the cost of installing alternating-current automatic block systems reduced accordingly.

The only other striking improvement in signal apparatus has been the development of the electro-mechanical interlocking system, in which the switches and their locks are operated manually and controlled electrically, the signals being electrically operated. This system possesses the combined safety features of manual and power operated interlockings at a cost about midway between the two. Its use is confined to plants where the farthest switch is located within about 800 ft. of the operating levers, and so far it has not been applied to interlockings of any considerable magnitude, or where the rapid operation of switches and signals is necessary, such as in terminal yards. Very many interlockings can be satisfactorily operated by it, and its use is rapidly increasing.

Numerous minor developments in products have been made during the past year, the improving of insulation in electrical material, the standardization of details to fit them for more universal application, and the modification of designs to cheapen the cost of production and expedite delivery of orders. Porcelain and insulating moulded material has been substituted, in many instances, for parts previously made of metal and insulated from their electrical connections by bushings and washers.

Freight rates from Buenos Aires, Argentina, to Asuncion, Paraguay, are, speaking generally, as much as rates from Europe or the United States to Buenos Aires.

* From The *Electric Journal*, Pittsburgh.

[illegible]

Ticket Order Form.

For the foregoing information and for the illustrations published herewith, we are indebted to E. O. McCormick, vice-president, and Charles S. Fee, passenger traffic manager, of the Southern Pacific.

The statistical office of the city of Dusseldorf has published the average daily wages paid to unskilled adult male laborers in 23 cities in Germany with populations of 20,000 or more inhabitants. The high average wage in 1910 was in Munich; it amounted to \$.880, as compared with \$.547 in the same city in 1893. The low average wage in 1910 was in Stettin, and amounted to \$.595, as compared with \$.536 in the same city in 1893. The average wage of all the 23 cities in 1910 was \$.774, as compared with \$.569 in 1893. In 1893 the high average was in Bremen and amounted to \$.714, as compared with \$.762 in the same city in 1910. The low average wage in 1893 was in Leipsig, and amounted to \$.476, as compared with \$.833 in the same city in 1910.

General News Section.

The city government of Waterville, Me., has voted to "request" the Maine Central to refrain from using soft coal in the switching engines in Waterville yard.

The Louisville & Nashville has growing, on tracts of land along its lines, about 2,000,000 catalpa trees, many of them on grounds surrounding the homes of track foremen, where they are valuable for shade.

The Pennsylvania Railroad has installed telephones for the use of train despatchers on the line between Renovo and Kane, Pa. A similar change has been made on other sections of the company's lines in the northern part of Pennsylvania.

The train shed of the Nashville, Chattanooga & St. Louis, at Chattanooga, Tenn., was destroyed by fire on the morning of January 10, together with a train of passenger cars. The historic locomotive, "General," which stands in this station, was saved from the flames.

The Lehigh Valley has extended its telephone train despatching wires by putting up a line between Packertown and Bernice, 140 miles, and expects soon to put telephones in use between Wilkesbarre and Sayre, 90 miles. The apparatus is furnished by the Western Electric Company.

A bill has been introduced in Congress by Senator Jones, of Washington, to require railways doing interstate business to adopt uniform operating rules. The purpose seems to be to make compulsory, through governmental intervention, the rules of the American Railway Association.

Governor Tener, of Pennsylvania, in his inaugural address, recommends the radical enlargement of the powers of the State Railroad Commission, the passage of an employers' liability law, and a compulsory strike arbitration law, supervision of mining operations and mining machinery, with a view to the protection of employees, a general revision of taxation laws and state assistance in highway and waterway improvement.

The evening of January 10 was "Union Pacific" night with the Men's Club of the First Presbyterian church of Omaha, Neb. Edson Rich, of the law department of this road, acted as chairman, and talks on railway affairs were made by J. A. Munroe, freight traffic manager; N. H. Loomis, general solicitor; Gerrit Fort, passenger traffic manager; C. J. Lane, first assistant general freight agent; D. C. Buell, director of the educational bureau of information; J. C. Young, signal engineer, and H. J. Stirling, auditor. Some of the speakers told of the effects that are resulting from regulation of railways.

One of the last acts of Governor Campbell of Texas before his retirement from office was to order the attorney general to bring suits against the Missouri, Kansas & Texas Railway of Texas and the International & Great Northern for the forfeiture of their charters. The instructions seems to be based on two grounds. One is that the majority of the stock of each of the roads is owned by outside corporations, which it is contended violates the constitutional requirements of the state that the railways doing business there shall be Texas corporations, and the other is that these roads are insolvent, because their indebtedness is in excess of the value of their properties. The governor also suggested suits against some other railways on the same grounds.

J. C. Clair, industrial commissioner of the Illinois Central, delivered an address in Representatives' Hall at Montpelier, Vt., on January 13, on industrial matters in Vermont, and in the course of his remarks referred especially to the railway question. Mr. Clair is a native of Vermont and an old friend of Governor J. A. Mead, and it was at the personal request of Mr. Mead that the address was delivered. The governor presided at the meeting and introduced the speaker. Mr. Clair described the work being done by the western railways for the development of traffic-producing industries on their lines. Referring to criticisms of inefficiency in management, he said that the railway industry is the only one that has given any tangible evidence to the public of increased efficiency, and called attention to the fact that a locomotive engineer is now hauling nearly 400 net tons per

locomotive as against 200 net tons ten years ago, an increase in efficiency of 100 per cent. This increase in efficiency has been brought about by the extensive improvements in the plants, and the people have received the benefit of it because, in spite of the fact that very large increases have taken place in the wages of labor and in the cost of materials and supplies, the price of transportation has not been increased, while prices in other lines have increased.

The Indiana Legislature sustains its reputation as a fertile field for all kinds of legislation to regulate the details of railway operation. The Senate committee has reported favorably on a bill to make railways liable for damages on account of fires along the line, with a proviso that the railway may insure such property. Representative Thornton has a bill providing that when a railway discharges a man for dishonesty, it shall let him see the "spotter" who testified against him. It is said that the brotherhoods are promoting this bill. Representative Hammond has a bill providing for boiler inspection, and another requiring cabooses to be 24 ft. long, with two trucks. It is claimed that small cabooses are dangerous when trains are being pushed, but railway officers declare that their short cabooses are perfectly safe. There is another bill in the Senate providing for inspection of locomotives, and one requiring enginemen and conductors to have had three years' experience in "railroading" before taking charge of a train. A bill to provide compulsory compensation for injured employees is being opposed by the labor leaders. A representative has introduced a bill requiring a trains to "pull up to a station" and unload passengers before switching. The governor recommends elaborate legislation to regulate the issue of stocks and bonds.

Automatic Train Stop Tried at Philadelphia.

The Railway Automatic Safety Appliance Company, of Wilmington, Del., controlling the automatic train stop of Edward M. Cain and John La Barre, made exhibition tests of the device on a track of the Pennsylvania Railroad near the Greenwich pier, Philadelphia, January 5, 6, and 7, and all the tests were successful. The chairman of the Pennsylvania State Railroad Commission witnessed some of the tests, as did a number of officers of the Pennsylvania, the Reading and the Baltimore & Ohio. This is a mechanical trip, consisting of a horizontal arm fixed on the top of a post about 4 ft. high, and so arranged that when in the engaging position it will strike an air valve fixed on the buffer beam of the locomotive. Mr. Cain is a conductor on the Pennsylvania.

The Railway Electrical Engineer.

The *Electric Trunk Line Age* and the *Railway Electrical Engineer*, the official journal of the Association of Railway Electrical Engineers, have been consolidated under the name given at the head of this note. The journal in its enlarged form continues to be the official organ of that organization. C. L. de Muralt, of the firm of Muralt & Co., engineers, and professor of electrical engineering at the University of Michigan, is editor. He is well known in connection with the electrification of the Swiss mountain railways and the Alberg tunnel in Austria, and he has also done work in this country for the Erie Railroad, and on the Detroit river tunnel electrification.

Collision at Batavia.

In a rear collision of westbound passenger trains on the New York Central, at Batavia, N. Y., about 5:30 on the morning of January 13, six passengers were killed and ten or more were injured. Train No. 23, running at 30 or 40 miles an hour, crashed into the rear of train No. 49, which was standing at the station; and the rear car of No. 49, a sleeping car, was completely wrecked, the engine going through this car and a short distance into the one next ahead of it. The roof of the sleeper was thrown over on the roof of a shed at the side of the track. The wreck took fire, and some of the victims were severely burned; others were scalded by steam escaping from the boiler of the wrecked locomotive. The engineer and fireman of No.

23 jumped off and escaped with slight injuries. An officer of the road said that train No. 23 had run past a distant and a home signal set against it. The engineman had been in the service of the road 40 years, and had been an engineman for the last 22 years, with a perfect record. Rain was falling at the time, and was freezing; but it does not appear that there was any fog.

Combined Visible and Audible Signals at Highway Crossings.

At six highway grade crossings the Lehigh Valley now has in use warnings for wayfarers consisting of disk signals, like regular Hall block signals, which are equipped with bells of the usual form and give both a visible and an audible warning when trains are approaching. These signals are at South Plainfield, N. J.; Lodi, N. Y.; Wyalusing, Pa.; Glen Summit, Pa.; Sunnyside, N. J., and Valentines, N. J. The bell, which is a 14 in. gong, is fixed in the lower part of the case and is protected by a wire screen. These signals are controlled by track circuits,



Highway Crossing Signals at South Plainfield, N. J.

so arranged that the bell will begin ringing and the disk will show red when an approaching train reaches a point about 2,000 ft. from the crossing. The light, for the night indications, is in the upper part of the case, as in block signals. There are two signals at each crossing, one on either side of the tracks and both are set at the right of the highway, as seen by a person approaching the railway. The use of these "banjo" signals for this purpose would seem to indicate that the Lehigh Valley is replacing banjos with semaphores in its block signal work. But will not this practice set a mischievous example? Automobilists who enjoy the benefit of these expensive signals at Lehigh Valley crossings will soon want them everywhere; and then, as a next step, to help them maintain their break-neck speeds, they will ask for distant signals! And the public service commission will have to back up their demand, of course.

Exports of Iron and Steel.

Exports of iron and steel manufactures for the calendar year 1910 exceeded the total of any previous year in the history of the industry. According to the Bureau of Statistics of the Department of Commerce and Labor, the exports of this class aggregated \$200,000,000, forming about one-quarter of the total of manufactures exported during the year, valued at \$830,000,000. The greatest value of exports of iron and steel manufactures prior to 1910 was in 1907, when it was \$197,000,000.

Dinner to J. T. Harahan.

A dinner was given to J. T. Harahan at the Blackstone Hotel in Chicago on January 13 by a large number of his friends, who are prominent in the railway business. In the course of an address Mr. Harahan denounced the men who as officers of the Illinois Central had betrayed his confidence in them during the last years of his administration. He said it was his deepest regret that anything should have occurred during his administration to warrant criticism of the management of the Illinois Central, and added: "While betrayal of any position of honor and responsibility is much to be deplored, the particular feature of this whole matter which has caused me pain is the treachery to me of men whom I have trained and educated, some of them

for more than 30 years, and whom I have caused to be placed in the position they occupy.

"I feel, however, that no man could have anticipated the irregularities which existed and the schemes that were employed to put them into effect, or could have discovered them any quicker than they were. Strong influences were brought to bear to cause us to discontinue the investigation, but these were of no avail and no stone was left unturned to punish the guilty parties."

Regarding government regulation Mr. Harahan said:

"I appeal at this time for some consideration to the railways. In the last few months there has been indications of a more tolerant attitude on the part of the public. I believe that the fair-minded are appreciating the difference between the substance and the shadow, though they have heard much adverse to railway interests. I have much faith that the American public will solve this matter in a way right and proper, but unless this solution shall be found in such a way as to result in increasing the revenues of the roads I cannot at this time foresee the means to provide the additional facilities which are needed to handle properly and expeditiously the ever increasing traffic of the country."

Charles H. Markham, Mr. Harahan's successor, said that Mr. Harahan's retirement was a loss to the railway world. Other speakers were George R. Peck, Charles U. Burch, George W. Parker, E. F. Trabue, W. L. Park and Blewett Lee.

Uniformity in Taxation of Corporations.

Prof. R. A. Seligman, of Columbia University, at the New York state conference on taxation, gave an address on uniformity in taxation, in which he said:

"We have sat by idly and supinely while many other states have made progress. Take, for instance, the recent constitutional amendment of California, which has revolutionized and unified the system of corporate taxation and has resolved the corporate taxes for the state; or take the system even as it is being worked out in Massachusetts, where there has been much attention devoted to this particular phase of the subject during the past decade, and where a far more satisfactory method of apportionment of state and local corporate burdens is being worked out.

"I am not here to demand the adoption of the Californian system. I know that many of our localities are dependent on the revenues from corporations. But if there is any one lesson that may be learned from the practice of our most advanced American states, as well as from that of the chief European states, it is that apart from the amendment of real estate, which ought, of course, to be a source of local revenue, far better results will be reached by a single uniform method of assessment of corporations in the place of the diverse methods that we employ.

"The relative needs of the state government and of the local governments in the proceeds of such unified corporation tax could be carefully studied, and then settled, if necessary, by a method of apportionment. Such a method is by no means new in this state. Take, for instance, the excise taxes. Who does not recognize the immense administrative improvement, reflected at once in the prodigious increase of the yield of the tax, that was effected when the administration of our liquor licenses was taken from the localities with their variations, their inconsistencies and their relative degrees of inefficiency, and turned over to the state government under a unified rule. What has happened in the excise tax would happen again in the corporation tax. The localities would, in all probability, secure under a unified and effective state assessment a larger revenue than they obtain at present, even though they took only a small share of the entire proceeds; while the gain in certainty of assessment, in equality of treatment, in simplicity of administration, would be almost incalculable.

"In short, what I plead for, even as the next step forward, is a thorough investigation of the whole subject of the taxation of corporations."

Governor Wilson's Views of Railway Regulation.

Governor Woodrow Wilson, of New Jersey, in his inaugural address, recommends the granting of power to the public utilities commission to regulate rates, and in general to supervise corporations (railways) in detail (as is done in New York). He says:

We are much too free with grants and charters to corpora-

tions in New Jersey. A corporation exists, not of natural right, but only by license of law; and the law, if we look at the matter in good conscience, is responsible for what it creates. It can never rightly authorize any kind of fraud or imposition. It cannot righteously allow the setting up of a business which has no sound basis, or which follows methods which in any way outrage justice or fair dealing, or the principles of honest industry. The law cannot give its license to things of that kind. It thereby authenticates what it ought of right to forbid. We have a Public Utilities Commission, but it has hardly more than powers of inquiry and advice. It could even, as it stands, be made a powerful instrument of publicity and of opinion, but it may also modestly wait until it is asked before expressing a judgment, and in any case it will have the uncomfortable consciousness that its opinion is gratuitous, and carries no weight of effective authority. This will not do. It is understood by everybody who knows anything of the common interest that it must have complete regulative powers. . . . This can be done, as experience elsewhere has demonstrated, not only without destroying the profits of the business of corporations, but also with the effect of putting it upon a more satisfactory footing for those who conduct it.

Proper regulation, based on thorough and authoritative inquiry, will go far toward disclosing and establishing those debatable values upon which so many questions of taxation turn. There is an uneasy feeling throughout the state, that there are glaring inequalities in our system—or, at any rate, in our practice—of taxation. The most general complaint is that there is great inequality as between individuals and corporations. I do not see how anyone can determine whether there is or not, for we have absolutely no uniform system of assessment. It would seem that in every locality there is some local variety of practice, in the rate, the ratio of assessment value to market value, and that every assessor is a law unto himself. Our whole system of taxation, which is no system at all, needs overhauling from top to bottom. There can be no system, no safety, no regulation in a multitude of boards. An efficient Public Utilities Commission will be a beginning toward a system of taxation as well as toward a system of corporate control. We cannot fairly tax values until we have ascertained and established them.

An Automatic Unloader.

The gondola car shown in the accompanying illustration posed for the photographer just after having discharged its lading by turning a somersault. The car was loaded with sheet bars,



An Automatic Unloader.

some of which are seen on the ground, and it appears that, while the train was running at a moderate speed, these bars shifted so seriously as to cause the car to jump the track. It fell down a bank about twenty feet high, and, making one complete turn, in which practically all the contents of the car were thrown out, it landed right side up in the bed of the stream, and with one of its own trucks resting on its floor, as shown in the picture. Con-

cerning the name of the road on which this accident occurred, we have nothing to say, except that it was not the road whose initials appear on the car. This combination unloading operation is one which, apparently, Mr. McMyler never thought of, or, at least, never attempted.

American Electric Railway Association.

On January 27 a conference of executive officials of member companies of the American Electric Railway Association will be held. The program is proposed to be as follows: Thomas N. McCarter, president of the Public Service Railway Co., Newark, N. J., will speak on Return on Investment. George H. Davis, of Ford, Bacon & Davis, New Orleans, La., will speak on The Adjustment of American Street Railway Rates to the Expansion of City Areas. Bentley W. Warren, general counsel of the Boston & Northern Street Railway, and the Old Colony Street Railway, Boston, Mass., will speak on Discount on Securities, and Clarence Deming, associate editor, *Railway Age Gazette*, will speak on Railway Arbitration; with an Example.

Traffic Club of New York.

At the meeting of the Traffic Club of New York held on January 17, Walker D. Hines, general counsel and acting chairman of the executive committee of the Atchison, Topeka & Santa Fe, spoke on the Recent Revision of the Interstate Commerce Law. The annual dinner of this club will be held at the Waldorf-Astoria on February 4. The speakers include: John A. Dix, governor of New York; William A. Glasgow, Jr., Philadelphia, Pa.; Thomas J. Freeman, receiver of the International & Great Northern; and J. Adam Bede, Pine City, Minn.

Empire City Passenger and Ticket Agents' Association.

At a meeting of the Empire City Passenger and Ticket Agents' Association, held on January 14 in New York, the following officers were elected: President, George R. Chesbrough, of the Delaware & Hudson; vice-presidents, H. T. Safford, division passenger agent of the St. Louis & San Francisco, and Frank Riley, of the Pennsylvania; secretary and treasurer, Raymond Walton, city ticket agent of the Missouri Pacific.

Chicago Transportation Association.

The Chicago Transportation Association held its annual banquet at the Wellington Hotel on January 16, and the officers who were elected at the December meeting for the ensuing year, as announced in the *Railway Age Gazette* of December 9, page 1122, were installed.

Canadian Society of Civil Engineers.

At the meeting of the Canadian Society of Civil Engineers, held in Montreal, Que., on January 19, a paper was read by A. O. Austin on The Development of Efficiency in High Tension Transmission Insulators.

New York Railroad Club.

The next meeting of the New York Railroad Club will be held on January 20 in New York. H. H. Maxfield, master mechanic of the Pennsylvania Railroad at Trenton, N. J., will read a paper on The General Layout for a Modern Locomotive Repair Plant.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
 AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; next meeting, June 22, 1911; Niagara Falls, N. Y.
 AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., 1911.
 AMERICAN ASSOCIATION OF LOCAL FREIGHT AGENTS' ASSOCIATION.—G. W. Dennison, Pennsylvania Co., Toledo, Ohio.
 AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and Sept.
 AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.
 AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 17, New York.
 AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Sept. 17-19, 1911; St. Louis, Mo.
 AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—E. H. Fritch, Monadnock building, Chicago; March 21-23, 1911, Chicago.

Traffic News.

James Bloomingdale has been chosen chairman of the Middle States Freight Association, in place of C. W. Bullen, resigned; office 143 Liberty street, New York City.

The Philadelphia & Reading announces that beginning February 17, single trip one way fares on the Reading lines will be at the rate of 2½ cents a mile. Most or all of these rates at present are 2 cents a mile.

The Interstate Commerce Commission will hold a hearing regarding allowances to tap line railways in St. Louis, Mo., beginning January 23. This will be a continuance of the investigation which was begun with the hearing at New Orleans.

The Western Pacific has made a reduction of 50 cents a ton in the rates on coal in carloads to California from mines in Colorado and Utah. Coal is not cheap in California even with this reduction, the freight rates ranging from \$7.35 to \$8.35 a ton.

Governor Campbell of Texas renews in his annual message his advocacy of the passage of a 2-cent fare law. Governor Campbell has been regularly trying, every time the legislature has met, to get a 2-cent fare law passed, and regularly has been defeated.

The railway agriculturist causes the fruit of his mental activities to thrive in the most unpromising soil. The San Pedro, Los Angeles & Salt Lake, supposed to lie mostly in a desert, is to run a farmers' instruction train. The Utah College of Agriculture, the University of Nevada and the University of Idaho will co-operate.

The Chicago & Alton has announced that it will put in service on January 22 a fast mail train between Chicago and St. Louis, which will run between these points, a distance of 284 miles, in 6 hours and 15 minutes. This is about 2 hours and 45 minutes less than the schedules of the better passenger trains at present. It will carry no passengers.

Burlington's New Through Service to the South and Southeast.

The Chicago, Burlington & Quincy announces the completion of its new line to Metropolis, Ill., and Paducah, Ky., connection is made at these points with the Nashville, Chattanooga & St. Louis, thus forming a direct line from St. Louis to Metropolis, Paducah, and all points reached by the Nashville, Chattanooga & St. Louis. Trackage rights have been acquired for Burlington trains over the Louisville & Nashville between East St. Louis and Woodlawn, Ill., 69 miles, making a direct freight route to Paducah. Through fast freight trains began running January 10 from St. Louis to Paducah, Nashville, etc., and to points in Georgia. Fast through freight service has been established to all important points in the south.

The Cotton Bill Frauds.

Suits have been entered in court at Decatur, Ala., against the Louisville & Nashville and the Southern Railways by English and German creditors of Knight, Yancey & Co., to recover losses sustained in connection with fraudulent bills of lading for cotton. The plaintiffs are Alexander Eccles & Co., of Liverpool, and Knopp and Fabarius and seven other merchants, of Bremen, Germany. Other English creditors are expected to file similar suits within the next ten days. The total sum for which action will be brought by English creditors is said to be more than \$2,000,000, and by Germans about \$300,000. The gist of the action is found in the following allegations:

The firm of Knight, Yancey & Co. had been in the habit of obtaining money on drafts secured by spurious bills of lading similar to those upon which the present actions are brought, for the past five years. A month or two after each bill of lading was issued, Knight, Yancey & Co. would buy cotton similar to that called for by the bill and ship it forward under the same marks as those described in the bill of lading. When the cotton arrived

AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; May 9, 1911; Detroit, Mich.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago; June 14-16, 1911, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Hartoun, Bloomington, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wednesdays, except June and August; New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 29th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; April 26, 1911; New Orleans, La.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; May, 1911; Montreal, Can.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—G. B. Colegrove, I. C. R.R., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; June 19, 1911; Boston, Mass.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York; June 20-21, 1911, Cape May City, N. J.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug.; Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal; annual, January 24-27, Winnipeg, Man.

CAR FOREMAN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month; annual, Oct. 9, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug.; St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday; Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh, Pa.; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Duluth, Minn.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—H. D. Judson, 209 East Adams St., Chicago; Wednesday preceding 3d Thursday; Chicago; annual, July 19, Chicago.

INDIANAPOLIS RAILWAY AND MECHANICAL CLUB.—B. S. Downey, C., H. & D., Indianapolis, Ind.

INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; next convention, Omaha, Neb.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May 15-18, 1911; Chattanooga, Tenn.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn. Next convention July 25-27, Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Iowa; 2d Friday in month, except July and August; Des Moines.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago; June 19-21, 1911, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept.; Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P.; 4th Saturday; Richmond, Va.; 20th annual, June 21st, 1911, St. Paul, Minn.

OMAHA RAILWAY CLUB.—A. H. Christiansen, Barker Bldg.; second Wed.

RAILWAY CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month; Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; March 20, Chicago; annual, Oct. 10, Colorado Springs, Colo.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio; annual, May 22-24, 1911; Milwaukee, Wis.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Oct., 1911; St. Louis.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Prudential bldg., Atlanta, Ga.; 3d Thurs.; Jan., April, August and Nov.; Atlanta.

TOLEDO TRANSPORTATION CLUB.—L. G. Macomber, Woolson Spice Co., Toledo; 1st Sat.; annual, May 6, 1911; Toledo.

TRAFFIC CLUB OF NEW YORK.—C. An Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August; New York.

TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly; Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 20, 1911; Baltimore, Md.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; 1st Sat. after 1st Wed.; annual, Dec. 11, 1911.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August; annual, May 8, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August; Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago.

at its destination abroad, it would be delivered upon the surrender of the spurious bill of lading, despite the fact that the spurious bills differed in date and number and in other respects from the manifest accompanying the cotton. It is further alleged that this practice of Knight, Yancey & Co. was connived at by the officers of the railways, and that upon questions arising as to the propriety of a delivery of cotton upon a draft secured by a spurious bill of lading the matter would be referred to the railway concerned, and the railway would direct delivery, thus preventing the discovery of the forgeries and enabling Knight, Yancey & Co. to continue the course of dealing which led to their subsequent failure. It is alleged that more than 400,000 bales have been thus delivered on forged bills, and that when the failure came there were outstanding forged bills of lading for over 50,000 bales of cotton upon which no cotton had ever been delivered. The creditors maintain that this connivance on the part of the railways renders them equally liable with Knight, Yancey & Co. for the loss sustained.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 87, giving a summary of car shortages

and surpluses by groups from September 1, 1909 to January 4, 1911, says:

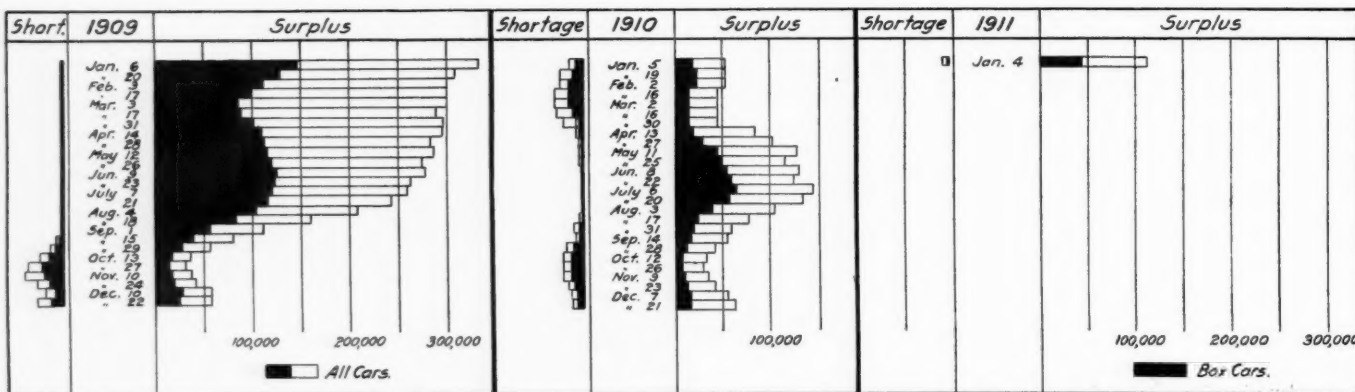
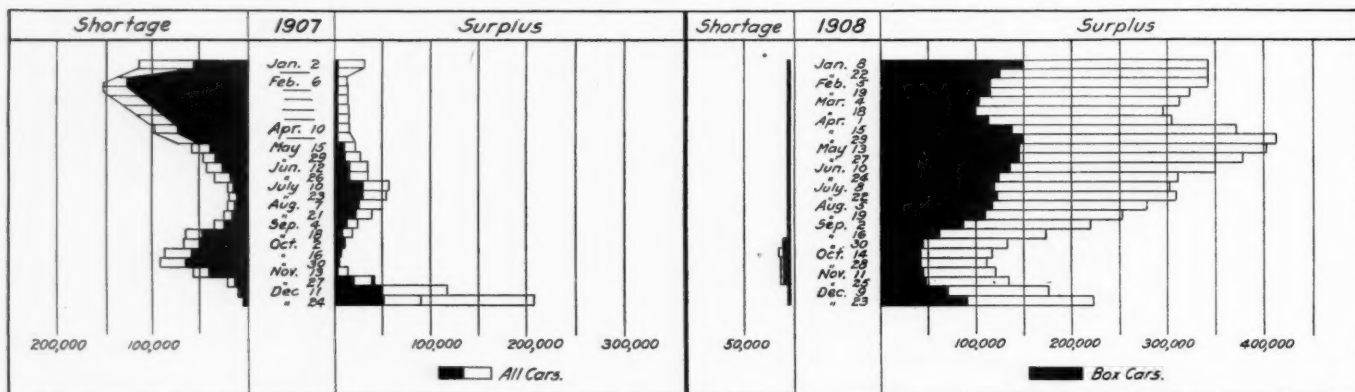
"There was an increase of 48,314 over the surplus shown in our last report, making a total for this report of 110,342 cars. The increase in box car surplus was 22,908 cars, and in coal and gondolas 16,834 cars. The increase was general throughout the country with the exception of group 7, which shows a slightly reduced surplus. Of the groups showing increases, group 9 (Southwestern), shows the least change, the increase in this group being only about 20 per cent.

"The shortage was reduced from 10,705 to 3,508, and the coal car shortage reported in our last Bulletin for groups 2 (Eastern), 3 (Middle), and 4 (Middle Atlantic), was practically wiped out. It will be remembered that rather severe weather was experienced at this time last year, which retarded the movement of cars, while with the comparatively mild weather of the past few weeks, cars have moved more freely. It is probable that the increase in surplus over last year may be in a great measure due to the difference in weather conditions."

The accompanying table gives surpluses and shortages by groups for the last period covered by the report and the charts show total surpluses and shortages in 1907, 1908, 1909, 1910 and 1911.

CAR SURPLUSES AND SHORTAGES.												
		Surpluses					Shortages					
Date.		No. of roads.	Box.	Flat. and hopper.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group #1.—	January 4, 1911.....	8	939	1,874	526	280	3,619	1	0	102	45	148
" 2.—	" 4, 1911.....	24	4,495	267	4,998	4,811	14,571	19	6	1	5	31
" 3.—	" 4, 1911.....	26	4,041	718	16,019	2,819	23,597	0	0	0	481	481
" 4.—	" 4, 1911.....	10	3,146	286	1,298	1,189	5,919	0	64	13	0	77
" 5.—	" 4, 1911.....	17	1,070	276	1,071	540	2,957	991	417	0	13	1,421
" 6.—	" 4, 1911.....	21	8,369	1,366	3,665	4,825	18,225	48	200	44	548	840
" 7.—	" 4, 1911.....	3	357	356	819	469	2,001	0	0	0	0	0
" 8.—	" 4, 1911.....	15	4,936	304	2,691	3,098	11,029	0	47	0	3	50
" 9.—	" 4, 1911.....	12	1,775	142	554	723	3,194	0	0	0	0	0
" 10.—	" 4, 1911.....	20	5,462	2,347	2,790	8,271	18,870	5	0	0	6	11
" 11.—	" 4, 1911.....	4	4,771	690	52	937	6,450	0	253	0	196	449
Total		161	39,361	8,626	34,483	27,962	110,432	1,064	987	160	1,297	3,508

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia, and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF NOVEMBER, 1910. (SEE ALSO ISSUE JANUARY 13.)

Name of road.	Mileage operated at end of period.	Operating revenues			Way and structures.		Maintenance of equipment.		Traffic.	Trans- portation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total.	inc. misc.	Passenger.	Freight.	Passenger.									
Alabama Great Southern	309	\$266,248	\$84,800	\$351,048	\$42,412	\$93,522	\$10,147	\$117,607	\$10,216	\$10,216	\$273,904	\$108,335	—\$295	\$13,805	\$94,235	\$15,167	
Atlanta, Birmingham & Atlantic	662*	178,813	49,958	228,771	28,678	37,890	14,727	86,097	8,735	8,735	176,127	68,629	.....	15,000	236,303	17,697
Atlantic Coast Line	4,493	2,008,567	589,845	2,598,412	342,301	428,215	41,707	859,495	70,805	70,805	1,742,523	1,044,373	.....	95,500	53,629	—6,877
Bangor & Aroostook	627†	176,803	55,127	231,930	42,671	27,025	3,533	76,633	11,100	11,100	162,962	83,515	.....	10,575	98,823	148,626
Bessemer & Lake Erie	204	537,315	22,882	560,197	72,227	142,386	6,070	167,736	8,769	8,769	397,188	170,427	.....	2,525	180,990	17,437
Buffalo, Rochester & Pittsburgh	573	680,456	81,372	761,828	73,016	150,652	10,772	257,370	13,320	13,320	500,597	282,419	.....	6,000	266,638	25,400
Central Vermont	411	232,621	80,742	313,363	45,935	53,941	6,387	145,984	8,113	8,113	260,360	77,326	.....	110	266,638	25,400
Chicago Great Western	1,489	794,500	229,902	1,024,402	135,283	151,258	46,799	454,909	33,945	33,945	824,225	283,558	.....	10,750	66,571	13,172
Chicago, Rock Island & Gulf	471†	245,338	59,567	304,905	28,126	17,541	8,926	93,240	8,896	8,896	156,719	165,081	.....	32,822	250,759	85,618
Chicago, Rock Island & Pacific	7,396	3,925,813	1,544,878	5,470,691	702,914	665,658	157,311	2,193,181	140,129	140,129	3,893,196	1,928,616	.....	4,613	1,600,271	16,812
Cincinnati, Hamilton & Dayton	1,014‡	591,762	125,793	717,555	50,739	123,559	24,277	396,219	22,486	22,486	593,519	208,915	.....	32,723	176,192	81,523
Delaware & Hudson Co.	819§	1,607,650	195,587	1,803,237	137,241	264,687	17,807	596,219	40,496	40,496	1,056,540	796,871	.....	49,718	746,220	140,218
Duluth, South Shore & Atlantic	608	162,855	81,516	244,371	33,592	26,997	9,356	102,098	5,293	5,293	177,336	80,189	.....	18,000	62,504	124
Evansville & Terre Haute	310	148,670	57,149	205,819	25,076	35,065	5,140	73,449	7,338	7,338	147,530	77,560	.....	9,410	67,501	14,662
Georgia	307	209,825	77,537	287,362	26,524	41,815	10,481	116,053	14,808	14,808	209,393	96,526	.....	1,837	94,689	5,650
Grand Rapids & Indiana	587	278,088	124,851	402,939	60,346	73,882	18,838	193,438	23,173	23,173	356,352	78,261	.....	23,737	54,814	67,277
Houston & Texas Central	789	437,268	157,397	594,665	88,555	73,822	18,838	238,874	23,043	23,043	447,577	181,501	.....	20,042	161,459	42,965
Long Island	390	295,183	419,390	714,573	75,034	130,889	19,556	388,461	21,043	21,043	634,993	115,359	.....	93,453	93,453	89,068
Louisville & Nashville	4,591¶	3,679,914	899,656	4,579,570	487,172	761,011	76,607	81,062	88,445	88,445	3,243,404	1,627,768	.....	137,800	1,491,978	191,662
Midland Valley	324	93,242	36,374	129,616	21,317	18,087	2,144	33,030	11,796	11,796	86,374	50,005	.....	6,401	45,231	8,712
New Orleans, Mobile & Chicago	471	916,351	179,395	1,095,746	18,728	12,595	15,711	523,106	23,203	23,203	1,038,576	124,355	.....	5,448	66,916	15,039
Northern Central	471	916,351	179,395	1,095,746	18,728	12,595	15,711	523,106	23,203	23,203	1,038,576	124,355	.....	5,448	66,916	15,039
Pennsylvania R.R. Co.	1,416	3,436,965	619,031	4,055,996	443,412	231,331	15,711	1,883,442	82,473	82,473	3,093,951	1,329,742	.....	199,105	1,121,433	621,412
Pere Marquette	3,971	9,900,927	2,731,951	12,632,878	983,233	2,763,343	178,620	4,583,596	330,547	330,547	9,118,339	4,416,735	.....	417,679	3,920,469	1,015,416
Pittsburgh, Baltimore & Washington	2,377	1,020,144	279,877	1,300,021	198,022	208,430	36,874	595,375	31,953	31,953	1,071,014	325,472	.....	59,196	254,280	154,511
Philadelphia, Cincinnati, Chic. & St. Louis	1,468	2,320,551	615,107	2,935,658	192,867	259,668	27,745	334,587	31,784	31,784	1,446,650	427,696	.....	48,907	378,789	10,144
St. Joseph & Grand Island	319	92,380	34,568	126,948	36,209	64,825	73,995	125,606	6,017	6,017	2,408,574	910,494	.....	150,443	759,055	416,531
St. Louis & San Francisco	4,732	2,600,728	945,632	3,546,360	652,974	539,665	96,393	1,262,727	113,806	113,806	2,665,565	1,124,736	.....	144,592	980,144	159,502
Texas & New Orleans	501a	105,483	46,871	152,354	163,682	10,603	2,314	59,366	7,086	7,086	1,303,817	32,865	.....	4,000	28,865	12,555
Vandalia	458	234,600	87,809	322,409	81,326	58,468	7,984	128,166	9,749	9,749	285,693	56,997	.....	893	28,756	53,564
Virginian	827	662,000	198,859	860,859	86,090	162,825	27,617	371,136	19,372	19,372	667,040	287,681	.....	13,495	102,797	102,797
West Jersey & Seashore	474b	292,964	19,834	312,798	33,603	45,162	4,648	88,042	7,451	7,451	178,763	142,050	.....	5,445	134,495	53,144
Western Maryland	353	159,867	200,573	360,440	63,014	63,160	11,248	207,438	9,432	9,432	354,292	34,543	.....	3,989	184,204	19,500
Wheeling & Lake Erie	457	502,880	48,259	551,139	61,198	126,665	7,714	219,396	12,845	12,845	428,783	155,496	.....	20,842	135,342	—48,515
FIVE MONTHS OF FISCAL YEAR 1911.																	
Alabama Great Southern	309	\$1,237,257	\$486,341	\$1,899,124	\$228,774	\$431,697	\$51,151	\$567,574	\$45,474	\$45,474	\$1,324,670	\$574,454	—\$2,980	\$65,659	\$82,829	\$82,829	
Atlanta, Birmingham & Atlantic	662*	812,900	267,338	1,080,238	135,295	193,379	71,910	418,880	43,578	43,578	863,042	291,303	.....	55,000	236,303	17,697
Atlantic Coast Line	4,493	8,108,188	2,880,602	10,988,790	1,666,536	1,913,952	126,161	3,952,413	336,987	336,987	8,086,049	3,722,690	.....	472,000	3,250,690	56,703
Bangor & Aroostook	627†	844,227	325,814	1,170,041	214,119	158,320	16,551	371,423	53,751	53,751	814,164	428,271	.....	10,575	417,696	49,949
Bessemer & Lake Erie	204	3,868,119	591,549	4,459,668	422,746	662,556	40,206	1,044,504	39,535	39,535	2,209,547	1,893,149	.....	30,000	1,860,149	549,386
Buffalo, Rochester & Pittsburgh	573	3,464,296	108,595	3,572,891	454,988	734,425	60,107	1,556,007	65,957	65,957	2,571,484	1,581,379	.....	363	1,501,742	27,905
Central Vermont	411	1,059,044	545,101	1,604,145	247,162	242,081	37,527	715,193	35,114	35,114	1,278,077	404,411	.....	164,113	1,404,225	68,640
Chicago Great Western	1,489	3,797,563	1,332,266	5,129,829	669,078	798,902	238,130	2,088,160	177,746	177,746	3,972,016	1,566,547	.....	179,171	1,404,225	68,640
Chicago, Rock Island & Gulf	471†	867,046	309,485	1,176,531	125,678	198,124	44,118	436,469	40,388	40,388	806,280	456,503	.....	27,045	421,871	88,799
Chicago, Rock Island & Pacific	7,396	18,341,963	8,884,682	27,226,645	4,536,268	3,815,759	788,093	10,368,432	705,408	705,408	20,213,952	8,650,037	.....	1,150,443	7,447,793	830,905
Cincinnati, Hamilton & Dayton	1,014‡	2,989,214	1,541,701	4,530,915	337,258	706,984	122,977	1,846,853	110,194	110,194	3,124,246	1,121,887	.....	146,114	747,793	77,895
Delaware & Hudson Co.	819§	7,247,620	1,541,701	8,789,321	789,192	1,204,516	119,439	2,908,978	204,101	204,101	5,226,226	3,839,999	.....	218,866	3,624,271	25,907
Duluth, South Shore & Atlantic	608	935,861	475,324	1,411,185	202,764	147,993	52,431	518,402	37,941	37,941	959,081	526,113	.....	90,000	444,619	19,480
Evansville & Terre Haute	310	781,091	315,888	1,096,979	150,783	158,515	52,431	370,583	32,946	32,946	741,105	466,208	.....	47,050	415,290	5,990
Georgia	307	872,569	395,108	1,267,677	188,407	202,084	52,260	530,367	35,507	35,507	1,008,625	563,070	.....	10,570	329,147	25,014
Grand Rapids & Indiana	587	1,273,109	882,176	2,155,285	299,33												

Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between Railways of the American Railway Association, in presenting statistical bulletin No. 88, covering car balance and performance for September, 1910, says:

"Attention was called in our August bulletin to the similarity in car performance between that month and the corresponding month in 1907. This similarity is again noted in the September averages. The cars at home averaged 60 per cent., exactly the same as in September, 1907, this item showing a decrease in both years, with the usual increase in the loaded mileage, the latter averaging 71.4 per cent. in September, 1910, as against 70.3 per cent. in August. The increase in 1907 was from 70.8 per cent. to 71.8 per cent.

"The miles per car per day averaged 22, and the ton miles per car per day 375 (active cars 390), as against 24.0 and 354 (active cars 362) in September, 1907. The car loading was somewhat better this year as indicated by an increase in the tons per loaded car from 20.5 to 21.6. Compared with August, 1910, the general performance was improved. The tons per loaded car is the only item failing to show an improvement, this average decreasing from 22.0 in August to 21.6 in September. This slight reduction was more than offset by the increase in the per cent. of loaded mileage and the miles per car per day, producing a fair increase in the ton miles per car per day.

The accompanying table gives car balance and performance in September and the charts on the facing page show car earnings and performance in 1907, 1908, 1909 and 1910.

Eastern Rate Hearings.

Walker D. Hines, representing the Delaware & Hudson began the closing argument in behalf of the eastern carriers in the freight rate case before the Interstate Commerce Commission. The eastern case was concluded January 12.

Mr. Hines said that if the carriers had included an unlawful item in making a rate it was within the power of the commission to throw that rate out. If, however, legal basis only had been taken into consideration in making rates, the commission should declare these rates legal. The commission should be broadminded and not technical in reaching its conclusion and should recognize the commercial needs of the country. No maximum of rates should be fixed.

On the subject of the physical valuation of the roads, Mr. Hines spoke of the enhanced value of the properties, through the investments of surplus funds which, in themselves, represented denials to stockholders who should have something to recompense them for those denials. A rate based on physical valuation would inure to the advantage of roads running through the more densely populated sections.

Mr. Hines contended that the carriers had fully shown the necessity for and the reasonableness of the increased rates proposed.

E. D. Robbins, general counsel of the New York, New Haven & Hartford followed. He told of the many improvements under way and in contemplation by the New Haven road involving a total expenditure of \$37,000,000. Of this amount \$16,000,000 has already been spent in betterments and additions, leaving \$21,000,000 still to be laid out. In answer to questions he said that it was proposed to meet this expenditure so far as possible from the operations of the road, only resorting to the issue of new securities in the event that the revenues should not be sufficient to meet the demand.

Mr. Robbins said that it was not true that the traffic manager of the railways in adjusting rates was solely controlled by the desire to raise more money. The prosperity of his company depends upon the prosperity of its territory, and that consideration was always to be taken into account. He instanced a case where a proposed rate, in the opinion of the shipper, would have destroyed a certain industry. If the traffic manager had insisted upon imposing that rate he would have been killing the goose that laid the golden egg.

No rate should be raised beyond the point where commerce would not continue to flow without restriction. "I give it to you as my judgment," he said, "that the limit of the beneficial raise of rates to the railways from the selfish point of view of the railways themselves has been nearly reached, if not actually reached." He said that practically all of the freight business

CAR BALANCE AND PERFORMANCE IN SEPTEMBER, 1910.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Ill., Wis., Minn.	Iowa, Wyo., Neb., Dakotas.	Mont., Colo., Mo., Okla.	Kan., Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned.....	79,359	701,607	218,614	176,377	162,741	386,667	17,451	136,006	27,456	136,132	103,291	2,145,701
Average number of system cars on line.....	42,312	408,798	133,342	97,315	85,124	277,391	6,320	78,367	17,105	67,973	71,233	1,285,280
Railway-owned cars: Average foreign on line.....	40,510	275,272	98,622	55,746	48,218	137,023	12,678	51,396	19,173	60,207	29,617	828,462
Total Railway owned cars on line.....	82,822	684,070	231,964	153,061	133,342	414,414	18,998	129,763	36,278	128,180	100,850	2,113,742
Excess.....	3,463	.....	13,350	.....	.....	27,747	1,547	.....	8,822	.....	.....	.....
Per cent. of cars on line to total owned:												
Home.....	53	58	61	55	52	72	36	57	62	50	69	60
Foreign.....	51	39	45	32	30	35	73	38	70	44	29	39
All railways.....	104	97	106	87	82	107	109	95	132	94	98	99
Private cars on line.....	3,142	38,643	11,386	2,373	4,904	16,830	2,449	7,144	2,550	9,896	2,438	101,755
Total, all cars on line.....	85,964	722,713	243,350	155,434	138,246	431,244	21,447	136,907	38,828	138,076	103,288	2,215,497
Per cent. of cars in shop.....	5.22	5.57	8.88	8.71	8.88	6.02	4.28	9.40	5.59	6.73	6.81	6.76
No. of freight engines owned.....	1,149	10,281	2,928	3,007	2,493	6,183	495	2,565	722	2,555	2,143	34,521
Average cars on line per freight engine owned.....	75	70	83	52	55	70	43	53	54	54	48	64
Total freight-car mileage.....	43,880,811	497,539,148	159,607,045	113,923,946	111,946,118	316,761,114	31,745,819	92,797,617	31,164,506	122,474,991	84,708,464	1,606,249,579
Average miles per car per day.....	16.9	22.9	22.0	24.4	27.0	24.5	49.3	22.6	26.8	29.5	27.3	24.2
Per cent. loaded mileage.....	74.9	70.0	71.3	69.1	73.4	70.2	72.9	73.2	73.1	73.5	78.0	71.4
Ton-miles of freight, including company freight.....	479,393,148	8,334,098,911	2,569,785,738	1,849,854,133	1,647,209,076	2,662,808,636	433,835,368	1,355,754,656	396,886,368	1,775,645,247	1,204,961,302	22,710,232,583
Average ton-miles, including company freight:												
Per car-mile.....	11.0	16.8	16.9	16.2	14.8	14.4	14.3	14.6	12.7	15.2	14.2	15.5
Per loaded car-mile.....	14.8	23.9	23.7	23.5	19.3	19.6	19.6	20.2	17.4	20.6	18.2	21.6
Per car per day.....	186	384	372	397	400	350	743	330	341	447	389	375
Gross freight earnings.....	\$5,835,433	\$49,723,074	\$14,806,930	\$11,169,735	\$10,883,523	\$33,387,560	\$3,851,747	\$11,483,025	\$3,764,173	\$18,548,012	\$8,468,382	\$171,921,593
Average daily earnings: Per car owned.....	\$2.45	\$2.36	\$2.26	\$2.11	\$2.23	\$2.89	\$7.36	\$2.81	\$4.57	\$4.54	\$2.73	\$2.67
Per railroad car on line.....	2.35	2.42	2.13	2.43	2.72	2.69	6.76	2.95	3.46	4.82	2.80	2.71
All cars on line.....	2.26	2.29	2.05	2.40	2.62	2.58	5.99	2.79	3.23	4.48	2.73	2.59

done by the New Haven road was done at a loss, all of its profit coming from the transportation of passengers.

Hugh L. Bond, Jr., of the Baltimore & Ohio, urged that on the testimony and the record there could be no question that the increases in rates made by the tariffs in controversy were made after the most careful and deliberate consideration of all the circumstances, conditions or factors proper to be considered by the most experienced and skillful men available, with the purpose in view of not only obtaining additional revenue for the carriers but of affecting commercial conditions and the movement of traffic to the least possible degree and so to avoid subjecting the traffic in any class of articles to an oppressive rate. The traffic officers believe that the proposed rates are fair and reasonable to the shippers and as little as the carriers ought reasonably to get at this time.

Mr. Bond said that the credit of the railways, certainly of the Baltimore & Ohio, is in the hands of the commission in these proceedings. The ability of the road to bring and keep its properties up to modern railway standards also depended upon the decision. There was no evidence, he argued, from which the commission could revise the tariffs in question separately, or which would enable the commission to establish a schedule of maximum rates. "Should the commission," he said, "decide that the tariffs in question cannot be made effective, on the ground that any general increase of rates must be unreasonable, then the commission will, at the same time, decide that the Baltimore & Ohio system, and substantially all the roads in the trunk and central traffic territory, must not only stop progressing, but must go backward."

There is no evidence before the commission that any of the rates are unreasonable in themselves, and any conclusion that they are so must be based on the general ground that any general increase of rates at this time is necessarily of itself unreasonable.

Western Rate Hearing.

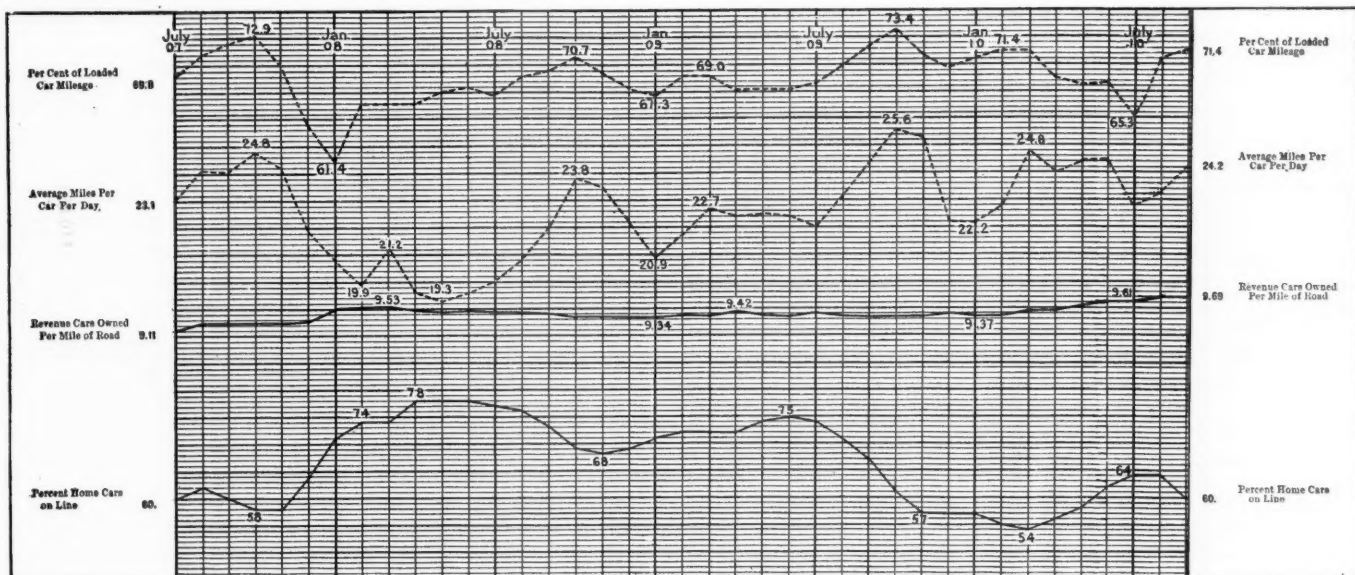
Arguments were submitted to the Interstate Commerce Commission on Monday in the case of the advances in commodity rates proposed by the lines that are in the Western trunk line territory.

In adjusting the time to be allotted to counsel for their arguments it was announced that forty-five minutes would be given to P. H. Morrissey, one of the principal leaders of organized labor, to speak in behalf of the proposed advance in rates.

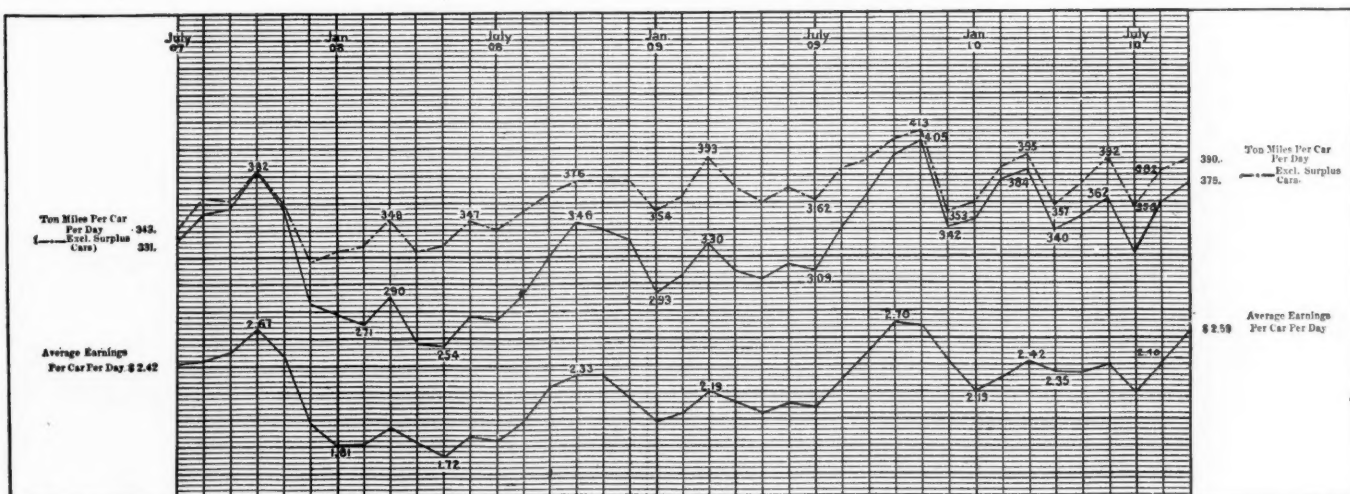
Frank Lyon, of counsel for the commission, said that the carriers frankly state that unless they should be restrained other increases in rates than those involved in these cases would be made where competition would permit. Mr. Lyon said that the increase in the cost to railways of labor during the last ten years had aggregated about thirty per cent.

Interrupting Mr. Lyon, Chester M. Dawes, counsel for the Chicago, Burlington & Quincy, explained that the payroll of that system, of \$30,000,000 annually, had been increased \$2,700,000 a year by advances in wages.

Burton Hanson, counsel for the Chicago, Milwaukee & St. Paul, pointed out that the valuation of that line was \$295,000,000. On that valuation the company was making a return of a little more than five per cent. "My contention is that the rates from



Car Performance in 1907, 1908, 1909 and 1910.



Car Loading and Earnings in 1907, 1908, 1909 and 1910.

which we receive this return are too low," said Mr. Hanson.

"The Supreme Court of the United States has said that this commission is not the general manager of the railways," suggested Edwin H. Hyzer, counsel of the Chicago & Northwestern, "and perhaps it is not, legally, but I am rather inclined to the practical conclusion that this commission is the general manager of the railways, and I think the railways think so, too.

"This commission represents the full police power of the government of the United States on this proposition. That is a tremendous power. That means, to my mind, that we must strip this controversy of the habiliments of law suits. This controversy must cease to be so much a controversy about pocketbooks, as here seems to have been indicated, and I do not much care whether it is the railroad pocketbook or the other fellow's. The fundamental thought of this commission seems to me to be, 'What are the needs of commerce?' We must cease to look at rates apart from commerce as a whole.

"The railways of this country to-day are practically at the feet of this commission, and the welfare and commerce of the country are there also.

"If this commission should undertake to put a valuation upon the railways and then to fit rates that would produce a flat six per cent. return, then, in my judgment, the commerce of this country will die unless the government owns the railways."

W. S. Horton, counsel for the Illinois Central, suggested that the return upon the whole property of the road in 1910 was only 4.48 per cent. This, he maintained, was wholly inadequate.

W. F. Dickinson, of the Chicago, Rock Island & Pacific, said in part:

"An examination of the accounts of this company for a number of years will show that with the payment of a very moderate dividend on its capital stock there never has been sufficient available surplus to warrant the expenditure of any substantial amount in making improvements. The practice of charging improvements and betterments to operating expenses has not been followed by this company for many years. Therefore, those improvements and betterments which have been made have been paid for out of borrowed money and charged to capital account, a process which is always costly unless the credit of the company is such as to warrant investors in paying at least par value for its securities. It goes without saying that the element of credit depends almost wholly upon the ability of the company to have a sufficient balance of income available for dividends to pay liberal dividends and carry a substantial amount to surplus."

Mr. Dickinson then exhibited a table to show the average freight revenue per freight train mile from 1898 to 1910, likewise the average freight operating expenses per freight train mile.

Combining these two sets of figures, the attorney was able to show that the average net freight revenues per freight train mile was 77 cents in 1898, 76 cents in 1900, 63 cents in 1905 and 52 cents in 1910. With the exception of the prosperous year of 1907, when this was 82 cents, this average net return has gradually decreased.

ASK FAIR RETURN ON VALUE.

Concluding he said:

"What we claim in this case and shall claim in all similar cases is the right to an income that will yield a fair return upon the value of the property, and it is upon this right that we base our claim for increased revenue."

Following Gardner, Lathrop, for the Atchison, Topeka & Santa Fe, took up the argument. He said that the western territory is in need of new railway construction and better equipment to take care of the business and give the people a proper service. It is to meet this condition, he continued, that the roads filed the increased rates.

Money is also needed to protect life and property. Many accidents are caused by mistakes of employees, but the greater portion are caused by some defect in the property which could be guarded against by the block signals and safety appliances.

Commissioner Lane wished to know whether if the commission decided to grant the increases it would be necessary to order the rates into effect for a period of two years. Mr. Lathrop thought that it would only be necessary to vacate the proceedings and enter no order whatever, thus leaving the rates liable to complaints from the shippers.

Mr. Morrissey said that he represented 180,000 employees of

the railways. He reviewed the petitions sent the commission by the labor organizations, and said that the increases were asked for because the public is now demanding a better service, more expensive cars, more expeditious traffic, etc. All of the argument was of the same general tenor as that of the lawyers preceding.

Mr. Morrissey expressed the opinion that union labor was opposed to the so-called "scientific management" idea, because, under it, men were driven under pressure which was a constant physical drain. The railway employees would not work under the system, he said. If there was to be a million dollars a day saved by the railways through efficiency methods, that money would almost all come out of the pockets of labor.

INTERSTATE COMMERCE COMMISSION.

Ton Mile Rate on Short Roads.

Frank W. Burton v. Unadilla Valley Railway et al. Opinion by Commissioner Lane.

Defendants ordered to establish a through route and joint rate of 16 cents per 100 lbs. on lumber from West Edmeston, N. Y., to New Britain, Conn., unless a separately established rate between New Berlin, N. Y., and New Britain of 13 cents per 100 lbs. is put in.

The per-ton-mile earnings of a small carrier, having only short hauls and light business, may properly exceed the per-ton-mile earnings of stronger lines participating in heavy traffic which moves for considerable distances. (20 I. C. C., 75.)

STATE COMMISSIONS.

A. B. Millar has been appointed secretary of the Pennsylvania State Railroad Commission, and will assume the duties of the office on February 1, succeeding H. S. Calvert, resigned.

The special report of the Indiana Commission relative to the need of the block system, which was sent to the governor a few weeks since, has been sent by the governor to the legislature without comment.

The Indiana Commission has sent to the railways a circular recommending that men repairing cars be provided with special locks so that they can lock switches to prevent disturbance of cars under which they are working.

David Harlowe, of Milwaukee, has been appointed a member of the Wisconsin Railroad Commission, succeeding Professor B. H. Meyer, recently appointed to the Interstate Commerce Commission. Mr. Harlowe will begin his duties on February 1, his term being for four years at a salary of \$5,000 per year. Mr. Harlowe has been an active transportation man in Milwaukee for nearly 25 years. He served in the traffic department of the Chicago, Milwaukee & St. Paul for eight years as a young man. For 17 years he has been traffic manager of the Allis-Chalmers Company and its predecessor, the Edward P. Allis Company.

COURT NEWS.

The Supreme Court of Georgia has sustained the law of that state, passed two years ago, requiring the use of electric headlights on all locomotives. The decision was in the case of the Atlantic Coast Line.

Judges Warrington, Sanford and Denison in the United States Circuit Court of Appeals at Cincinnati, January 13, rendered a decision sustaining the constitutionality of the act creating the Kentucky railway commission. The case was one brought by the Greenbrier Distilling Company of Chapline, Ky., against the Louisville & Nashville, and involved the reasonableness of the rates of the latter on soft coal from eastern Kentucky. The Kentucky commission ordered the rates reduced, and the road attacked the constitutionality of the law under which it acted, on the ground that it combined executive, legislative and judicial functions in one body, and conflicted with the commerce clause of the federal constitution. Both contentions were overruled.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

H. U. Wallace has been elected vice-president of the Fort Dodge, Des Moines & Southern, with office at Boone, Iowa.

F. D. Dale has been appointed auditor of the Leavenworth, Kansas & Western, with office at Leavenworth, Kan., succeeding G. T. Crandell, retired.

The officers of the Winston-Salem Southbound, which was recently opened for traffic, are as follows: H. E. Fries, president, Winston-Salem, N. C.; T. M. Emerson, vice-president, Wilmington; H. F. Wilkinson, secretary, Roanoke, Va.; J. F. Post, treasurer, and H. C. Prince, general auditor, both with offices at Wilmington, N. C. Mr. Emerson is also president, Mr. Post, treasurer, and Mr. Prince, comptroller of the Atlantic Coast Line.

George M. Shriver, assistant to president of the Baltimore & Ohio, has been elected second vice-president, with office at Baltimore, Md., succeeding to the executive position which has

been vacant since the relinquishment of its duties by Hugh L. Bond, Jr., general counsel of the company. Mr. Shriver entered the service of the Baltimore & Ohio in 1887, as a clerk in the accounting department, leaving that position to go to the United States Express Company, operating over the B. & O. In 1888 he went with Charles F. Mayer, then president of the Consolidation Coal Company, as his secretary, and in that capacity re-entered railway service in the fall of that year when Mr. Mayer became president of the Baltimore & Ohio. Mr. Shriver continued as secretary to the president when John K. Cowen in 1896 succeeded to the office of chief executive, and upon Leonor F. Loree becoming president in 1901 he promoted him to assistant to the president, which position he held at the time of his recent appointment as second vice-president. Mr. Shriver will have charge of the accounting department, and is to perform such other duties as may be assigned him by the president or board of directors.



G. M. Shriver.

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Operating Officers.

C. W. Bradley has been appointed inspector of transportation of the Chesapeake & Ohio, with office at Richmond, Va.

E. H. Zeigler has been appointed trainmaster of terminals of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Indianapolis, Ind.

H. J. Schwartz has been appointed a trainmaster of the Illinois Central, with office at Clinton, Ill., succeeding W. S. Williams, promoted.

J. E. Farrell has been appointed a trainmaster of the Chicago & Alton, with office at Roodhouse, Ill., succeeding W. H. Gunzelman, assigned to other duties.

C. J. Balch has been appointed to the new position of assistant general manager of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal.

W. L. Wyman, assistant trainmaster of the Philadelphia & Reading, at Philadelphia, Pa., has resigned to go to the Canadian Pacific, with office at Calgary, Alb.

N. H. Goucher has been appointed superintendent of transportation of the Charlotte Harbor & Northern, with office at Arcadia, Fla., succeeding to the duties of J. M. Kelly, trainmaster.

W. N. Royall, general manager, and E. Borden, general superintendent of transportation of the Atlantic Coast Line, have had their authority extended over the Winston-Salem Southbound, both with offices at Wilmington, N. C.

A. L. Mohler, vice-president and general manager of the Union Pacific at Omaha, Neb., having returned after an absence, has assumed charge of the operation of the road, and Charles Ware, assistant general manager; W. D. Lincoln, assistant general manager, and W. R. Cahill, superintendent of the Nebraska division, will resume the duties of their respective offices.

Orville T. Waring, who has been appointed superintendent of the new Winston-Salem district of the Atlantic Coast Line, with office at Florence, S. C., as previously announced in these columns, graduated as a civil engineer from the University of Pennsylvania in 1902, and in July of that year began railway work in the engineering department of the Baltimore & Ohio. In July of the following year he was appointed assistant division engineer, and in August, 1905, he went to the Atlantic Coast Line as assistant engineer, leaving that company in November, 1906, to go to the Charleston & Western Carolina in the same capacity. He was promoted to assistant superintendent of that road in November, 1907, and the following year returned to the service of the Atlantic Coast Line as roadmaster. From September, 1909, to October of the following year he was acting engineer of roadway and was then appointed assistant engineer, which position he held at the time of his recent appointment as superintendent.

James Allen Kauffman, whose appointment as superintendent of the Tombigbee Valley has been announced in these columns, was born July 14, 1877, at Miamisburg, Ohio, and was educated



J. A. Kauffman.

in the public schools. He started to learn telegraphy in 1894 on the Cincinnati, Hamilton & Dayton, and the following year went to the Illinois Central as a clerk, at Holly Springs, Miss., and was later chief clerk and cashier to the joint agent of the Illinois Central and the Kansas City, Memphis & Birmingham, now a part of the St. Louis & San Francisco. About two years later he was appointed chief clerk, and was then consecutively despatcher and superintendent of the Ohio River & Columbus, at Ripley, Ohio. He was then superintendent, general manager, secretary

and a director of the Licking River, at Salt Lick, Ky., and was later appointed general manager of the Lafayette Railroad, at Lafayette, Ga., leaving that company to become consulting and afterwards chief engineer of the Oklahoma Midland Electric. His next position was chief engineer of the Newton & Northwestern, now a part of the Fort Dodge, Des Moines & Southern. In October, 1910, he was appointed chief clerk of the Tombigbee Valley, which position he held at the time of his recent appointment as superintendent.

Charles C. Walker, who has been appointed assistant general manager of the Chesapeake & Ohio, with office at Richmond, Va., as previously announced in these columns, was born June 21, 1858, in Albemarle county, Va., and was educated at Oldfield School. He began railway work in 1873, since which time he has been consecutively to 1876, messenger, receiving and delivery freight clerk, brakeman and fireman on the Richmond & Danville, now a part of the Southern Railway, and from 1876 to 1879

he was general operator on the Richmond, York River & Chesapeake, which is also now a part of the Southern Railway. He went to the Chesapeake & Ohio in August, 1879, as a clerk in the claim office, and was subsequently to January 1897, telegraph operator, train despatcher, chief train despatcher, and assistant division superintendent. He was appointed division superintendent at Richmond, Va., in January, 1897, and four years later was made general superintendent of the Eastern division. The following year he was appointed superintendent of transportation, and in May, 1910, he was promoted to general superintendent of transportation, which position he held at the time of his recent appointment as assistant general manager.

F. P. Gutelius, whose appointment as general superintendent of the Eastern division of the Canadian Pacific, with office at Montreal, Que., has been announced in these columns, was born December 21, 1864, at Mifflinburg, Pa. He graduated from Lafayette College as a civil engineer in 1887, and began railway work January 1, 1888, as assistant engineer on the Pennsylvania Lines West of Pittsburgh, and the following year was transferred in the same capacity to the Cleveland & Pittsburgh. From 1890, to June, 1891, he was assistant supervisor in charge of engineering work on the Cleveland & Pittsburgh for the sub-division north of Alliance, with office at Cleveland, Ohio, during which time he made surveys and preliminary plans for the elimination



F. P. Gutelius.

of grade crossings through Newburg, a suburb of Cleveland. He was out of railway work from June, 1891, until November, 1895, when he started the construction of the Trail Creek Tramway in British Columbia, and was later in charge of its operation as general superintendent. He built a 20-mile extension of this line which afterwards became the Columbia & Western, and is now a part of the Canadian Pacific. In September, 1899, he was appointed resident engineer in charge of maintenance of the Canadian Pacific lines in the Kootenay district, B. C., and the following year was made inspecting engineer on maintenance work for the Canadian Pacific system. In June, 1902, he was appointed engineer of maintenance of way, which position he held until the spring of 1906, when he was made assistant chief engineer in charge of all engineering work on the Eastern lines, and he also prepared engineering standards for the entire system. He was appointed general superintendent of the Lake Superior division in September, 1908, which position he held at the time of his recent appointment as general superintendent of the Eastern division.

Traffic Officers.

W. B. Wheeler has been appointed general agent of the Rock Island Southern, with office at Pittsburgh, Pa., a new agency.

Frederick C. Lang has been appointed a freight solicitor of the Union Line of the Pennsylvania Lines West of Pittsburgh, in connection with the Chicago agency.

F. A. Acker, traveling freight agent of the Northern Pacific at St. Paul, Minn., has been appointed a traveling freight agent, with office at Kansas City, Mo., a new office.

W. G. Cooper, Jr., has been appointed general freight and passenger agent of the Charlotte Harbor & Northern, with office at Boca Grande, Fla., succeeding E. C. Hoskins.

H. A. Poveleite, general freight agent of the Queen & Crescent at Cincinnati, Ohio, has been appointed a member of the Uniform Classification Committee, with office in Chicago.

M. J. McMahon, assistant general freight and passenger agent of the Buffalo & Susquehanna at Du Bois, Pa., has been appointed traffic manager of the New Orleans Great Northern, with office at New Orleans, La.

F. B. Townsend, coal freight agent of the Minneapolis & St. Louis and the Iowa Central at Chicago, has been appointed an assistant general freight agent, with office at Minneapolis, Minn., and his former office has been abolished.

C. G. Mills has been appointed manager of the Montana Demurrage Bureau and agent of the Western Railway Weighing Association and Inspection Bureau, with office at Butte, Mont., succeeding R. H. Ingle, commissioner, resigned to engage in other business.

A. D. Williamson, traveling freight agent of the Seaboard Air Line, at Live Oak, Fla., has been transferred to Bradentown, in charge of the territory from Turkey creek to Venice, which territory was formerly covered by the Tampa office. W. M. Bullard succeeds Mr. Williamson, with office at Live Oak.

W. J. Craig, passenger traffic manager, and R. A. Brand, freight traffic manager of the Atlantic Coast Line, have had their authority extended over the Winston-Salem Southbound, both with offices at Wilmington, N. C. S. P. Collier, Jr., is general freight and passenger agent of the Winston-Salem Southbound, with office at Winston-Salem.

F. H. Montgomery, traveling agent of the Lackawanna Line at Seattle, Wash., has been appointed traveling freight agent of the New York, Chicago & St. Louis, with office at Buffalo, N. Y., succeeding E. S. Manchester, promoted. E. J. Stoll, traveling freight agent of the New York, Chicago & St. Louis at Portland, Ore., has been appointed commercial agent, with office at Omaha, Neb., succeeding H. F. Curtis, resigned to engage in other business, and James Trumbull succeeds Mr. Stoll.

Engineering & Rolling Stock Officers.

T. S. Abbott, chief engineer of the Coahuila & Zacatecas at Saltillo, Coahuila, Mex., has resigned.

The office of G. S. Bruce, chief engineer of the Charlotte Harbor & Northern, has been transferred from Arcadia, Fla., to Boca Grande.

E. B. Pleasants, chief engineer, and R. E. Smith, general superintendent of motive power of the Atlantic Coast Line, have had their authority extended over the Winston-Salem Southbound, both with offices at Wilmington, N. C.

M. H. Elkin, division engineer of the Lehigh Valley, at Auburn, N. Y., has been transferred to Hazleton, Pa., succeeding F. W. Gilcreast, resigned to go to another company. R. L. Gebhardt succeeds Mr. Elkin, with office at Auburn.

Purchasing Officers.

F. H. Fechtig, purchasing agent of the Atlantic Coast Line, has had his authority extended over the Winston-Salem Southbound, with office at Wilmington, N. C.

OBITUARY.

R. Forrester, consulting engineer of the Denver & Rio Grande, died at Seattle, Wash., on December 30.

Harry D. Annable, assistant foreign freight agent of the Canadian Pacific at New York, died on January 10. Mr. Annable was born in Canada 39 years ago. He had been associated with the Canadian Pacific for several years, having represented the company as general freight agent in London prior to his coming to New York about a year ago.

Edward S. Greenleaf, formerly superintendent of the Jacksonville Southeastern, now part of the Chicago, Burlington & Quincy, died at Jacksonville, Ill., on January 10. Mr. Greenleaf was born in Williamsburg, Me., June 5, 1838, and began railway work in 1855 with the Great Western Railway, now part of the Wabash. In 1866 he was made general freight and ticket agent of the St. Louis, Jacksonville & Chicago, now part of the Alton, and for a number of years after 1870 was superintendent of the Jacksonville, Northwestern & Southeastern and its successor, the Jacksonville Southeastern.

Railway Construction.

New Incorporations, Surveys, Etc.

CANADIAN PACIFIC.—The Kootenay Central, which has been taken over by the Canadian Pacific, is pushing construction work in the Columbia valley, B. C. The plans call for a line from Golden, B. C., following the shore of Lake Windermere, to Fort Steele, 175 miles. The work includes changing the course of Wild Horse creek.

CHEHALIS & COWLITZ.—Incorporated in the state of Washington with \$300,000 capital to build from Chehalis southeast to a point on the Cowlitz river, near the Plamondon donation land claim on Cowlitz prairie, 20 miles. Also to build branch lines. H. C. Coffman and G. A. Robinson, Chehalis, are incorporated.

CHICAGO, MILWAUKEE & PUGET SOUND.—A new branch has been opened for business from Warden, Wash., west to Marcellus, 47 miles.

CINCINNATI & NASHVILLE.—This is the new name of the Overton County Railroad, which is to be reorganized. The plans call for building from Livingston, Tenn., northeast via Byrdstown and Monticello, Ky., to Somerset, about 76 miles. Contracts for this work will be let in about four months. The work will be medium heavy, including some rock work and one tunnel. There are to be two steel bridges, also one trestle. The line will carry lumber, coal and merchandise.

CRYSTAL CITY & UVALDE.—This company has opened for business an extension from Crystal City, Texas, to Gardendale, 41 miles.

DELAWARE, LACKAWANNA & WESTERN.—According to press reports, this company is taking up options on 25,000 acres of coal lands in Armstrong county, Pa., and it is thought that the company will build a line into Armstrong county.

DENTON-SLIDELL.—The Denton Chamber of Commerce is back of a project to build a line from Denton, Tex., northwest to Slidell, about 20 miles. A. C. Owsley, Denton, is the principal promoter.

DENVER & RIO GRANDE.—An officer writes regarding the double-tracking work to be carried out between Denver, Colo., and Salt Lake City, Utah, that no definite plans have yet been made to carry out this work, and surveys are not being made. It is possible that the company may construct some double-track during 1911 in locations where the greatest congestion exists, but up to the present time no definite plans have been under consideration.

DULUTH, MISSABE & NORTHERN.—This company has opened for business new branch lines as follows: Silver branch, from Rainey Junction, Minn., to Canadian Junction, 2.6 miles; Woodbridge branch, from Sherwood, to Sharon, 3.9 miles.

GALLATIN VALLEY.—A new branch has been opened for business from Belgrade Junction, Mont., east to Belgrade, five miles.

GREAT NORTHERN.—An officer writes that grading work between Oroville, Wash., and Pateros has been finished. Work has been suspended on the extension to Wenatchee for the present. (December 2, p. 1096.)

GULF, VELASCO & NORTHERN.—An officer writes that contracts will probably be let within 60 days to build from Sealy, Texas, on the Gulf, Colorado & Santa Fe and the Missouri, Kansas & Texas, southeast via Rosenberg, Damon, Columbia and Brazoria to Velasco, on the gulf of Mexico, about 96 miles. The line will carry agricultural products, timber and live stock.

LEHIGH & NEW ENGLAND.—A contract has been given to McArthur Brothers Co., New York, to build an extension from Danielsville, Pa., near Slatington, west to Tamaqua, 32 miles. Construction work is to be started at once. (September 30, p. 599.)

LICKING RIVER.—An extension has been built from Blackwater, Ky., to Arnett, two miles.

MANUFACTURERS' RAILWAY.—An officer writes that construction work has been started to double the trackage capacity of

this line, which is wholly within the corporate limits of St. Louis, Mo. No contracts for the work will be let. The improvements include a union freight house, city delivery tracks and a storage yard.

MINNEAPOLIS & RAINY RIVER.—An extension has been opened for business from Bigfork, Minn., to Effie and Kenny, eight miles.

MISSOULA & HAMILTON.—Incorporated in Montana with \$500,000 capital, to build from Hamilton, Mont., north to Missoula, with a number of branch lines in Missoula and Ravalli counties. It has not yet been determined whether the company will use steam for the motive power or electric motor cars. Work on the line is to be started early this coming spring. The incorporators include: H. M. Sloan, R. A. O'Hara, Hamilton; F. I. Bennett, I. M. Cobe and L. A. Bushby, Chicago, all of the Bitter Root Valley Irrigation Company.

NASHVILLE-GALLATIN INTERURBAN.—An officer writes that surveys are to be started this month, and it is expected to have all the rights-of-way secured by May 1, so that construction work can be started about the fifteenth of that month. The plans call for a line from Nashville, Tenn., northeast to Gallatin, 30 miles. A contract has been given to the W. K. Palmer Engineering Company, Kansas City, Mo., for the locating survey, including profile, right-of-way map, etc. H. H. Mayberry, Franklin, may be addressed. (January 13, p. 104.)

NORTH COAST.—See Oregon-Washington Railroad & Navigation Company.

NORTH YAKIMA & VALLEY.—The Moxee branch has been opened for business from North Yakima, Wash., to Moxee City, 8.6 miles.

NORTHERN PACIFIC.—According to press reports, this company will spend about \$2,000,000 building a 35-mile double-track line between Tacoma, Wash., and Tenino. Surveys for this work were made about a year ago. The improvements to be carried out include piercing a tunnel under Tacoma, near Point Defiance, to be about one-half mile long, and the elimination of the big hill south of Tacoma. The new line will be used jointly by the Northern Pacific, the Great Northern and the Oregon-Washington Railroad & Navigation Company. (October 28, p. 810.)

OREGON ROADS (Electric).—Residents of The Dalles, Ore., are interested in a project to build an electric line from The Dalles to the Tygh valley.

F. M. Swift, Oregon City, Ore., is said to be back of a project to build an electric line through the Molalla territory.

The Lane County Asset Company of Eugene, Ore., has made financial arrangements, it is said, to build an electric line from Eugene to tidewater on Siuslaw Bay. The line is to be extended to Florence, 60 miles, and eventually south to Coos Bay, an additional 75 miles. A site has been secured on the water front for terminals at Siuslaw Bay.

OREGON SHORT LINE.—According to press reports, this company will make improvements to include laying 211 miles of track in Idaho during 1911 as follows: Track to be laid on grade from Caldwell to Homedale, 11.2 miles; extension from Richfield to High Prairie Summit, 67.2 miles; extension from Burley to Kelton Summit, traversing the Raft river project, 60.5 miles; new track from Ashton to Briggs, 37.5 miles; extension from Buhl to Salmon river crossing, 8.6 miles, and extension from Nissa east toward Homedale, 26 miles. At the Boise yards and terminals the platforms are to be extended.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—Contracts, it is said, will be let in February for building an 80-mile section of the North Coast division, between Spokane, Wash., and a junction with the present main line of the Oregon & Washington.

OVERTON COUNTY RAILROAD.—See Cincinnati & Nashville.

PACIFIC ELECTRIC.—This company has opened its new line between Pomona, Cal., Claremont, and Upland.

PUEBLO & NORTHEASTERN.—An officer writes that contracts will probably be let within 60 days to build from Pueblo, Colo., via Wilson, thence to a connection with the Missouri Pacific and the

Atchison, Topeka & Santa Fe at Nepesta. The work will include putting up two steel bridges. B. H. Tallmadge, of the Pueblo-Rockyford Land Company, is vice-president, Topeka, Kan.

PRINEVILLE & EASTERN.—Organized in Oregon with \$400,000 capital to build from Prineville, Ore., west to a point on the Oregon Trunk, 18 miles. Surveys are nearing completion, and it is expected to begin grading work from Prineville in a short time. T. M. Baldwin, G. M. Cornett, A. J. Noble, W. A. Booth and residents of Prineville are back of the project.

SANFORD TRACTION.—An officer writes that the plans call for a line from Sanford, Fla., south via Celery delta to Orlando, 30 miles, of which 16 miles has track laid and is leased to the company. Work on the rest of the line will be carried out by the company's men. S. O. Chase, president and A. P. Connelly, manager, Sanford.

SOUTH CAROLINA WESTERN.—An extension has been opened for business from McBee, S. C., south to Hartsville, 16 miles.

SOUTHERN PACIFIC.—An officer writes that surveys have been made from Contact, Nev., to Icarus, on the Southern Pacific east of Wells, but it has not yet been decided to build the line.

SOUTHERN RAILWAY.—This company will build an additional 10 miles of double track on its main line between Washington, D. C., and Atlanta, Ga. The work has been authorized on a section south of Franklin Junction, Va. The new track will be connected with second track already laid to Whittle which has never been used. When the new work is completed the five miles of single track between Franklin Junction and Sycamore will be operated as a gauntlet under absolute block. No train will be permitted to enter either end of the gauntlet while another is on it. The 28-mile stretch of double track from Montview, Va., to Sycamore will be increased to fifty miles by this addition, and the 12 miles from Montview to Monroe through Lynchburg which is just going into service. The completion of the Lynchburg improvement gives the Southern 239 miles of double track between Washington and Atlanta, which are 648 miles apart, and on completion of the improvement between Franklin Junction and Whittle the total double track will be 249 miles. (January 6, p. 62.)

TENNESSEE, ALABAMA & GEORGIA.—An officer writes that the company expects to begin work early this coming summer on a branch from Harrisburg, Ga., east to Trion, eight miles; also, from Rome to Rockmart, 29 miles. The work includes some heavy cuts and fills, three steel bridges, each 120 ft. long, a 2,500-ft. tunnel shops and terminal buildings are to be built at Chattanooga, Tenn. The principal commodities to be carried will be iron ore, coal and cotton. (December 23, p. 1205.)

TEXAS CENTRAL.—The De Leon branch has been opened for traffic from De Leon, Texas, to Cross Plains, 41 miles.

TIDEWATER RAILROAD.—A franchise has been granted by the officials of Birmingham, Ala., and surveys are being made to build from East Lake, southwest via Birmingham to Bessemer, about 25 miles, on which work is to be started soon. The line is eventually to be extended to Tuscaloosa and Gadsden. Morris Brothers, Philadelphia, Pa., are the financial backers of the project; J. M. Dewberry, vice-president, Birmingham.

UNITED PROPERTIES CO.—This company, which was recently incorporated in Delaware, it is understood, will build from San Jose, Cal., through the San Joaquin valley to Bakersfield, thence to Los Angeles. It is reported that the Hill interests are back of the project. (Jan. 13, p. 104.)

VERA CRUZ & ISTHMUS.—This company has finished work on a branch line from Rives, Mex., to Cuatutolepan, 13 miles, and from Brisbin to Cerro Colorado, 15 miles.

VIRGINIA & CAROLINA SOUTHERN.—The Elizabethtown branch has been extended from Tarheel, N. C., to Dublin, six miles.

VIRGINIA & SOUTHWESTERN.—This company has opened for business the section from Moccasin Gap, Va., southeast to Persia Junction, Tenn., 38 miles, where connection is made with the line to Bulls Gap, on the Southern Railway.

WESTERN PACIFIC.—An officer is quoted as saying that this company will build a line south to San Jose, Cal., within the next few months, and at a later time will build to Los Angeles.

Railway Financial News.

ALBANY SOUTHERN.—The directors of this company have declared an initial dividend of 1½ per cent. on the preferred stock, payable February 1. An officer of the company is quoted as saying that this is a semi-annual dividend, and that the declaration places the stock on a 3 per cent. annual basis.

BOSTON RAILROAD HOLDING CO.—Lee, Higginson & Co., Boston, and Higginson & Co., London, are offering at slightly below par cumulative 4 per cent. preferred stock of the Boston Railroad Holding Co., guaranteed principal and interest by the New York, New Haven & Hartford. Of this preferred stock there is now \$20,012,000 outstanding, and after the Holding company has subscribed for its share of the new Boston & Maine stock, there will be \$26,422,500 preferred stock outstanding. There is \$3,106,500 common stock, of which the New York, New Haven & Hartford owns \$3,006,500. The common stock only has voting power. The preferred stock is a first lien on a little over 51 per cent. of the outstanding Boston & Maine stock. The Boston & Maine stock cannot be sold or transferred without authority from the Massachusetts legislature.

BOSTON & MAINE.—See Boston Railroad Holding Co.

CANADIAN PACIFIC.—The New Brunswick Southern, for some time leased to the Canadian Pacific, is now to be operated as part of district 1 of the Atlantic division, and the St. Maurice Valley Railway, also leased by the Canadian Pacific, is to be operated as part of district 3 of the Eastern division.

CENTRAL NEW ENGLAND.—The \$1,250,000 first mortgage 5 per cent. bonds of 1899-1919, callable at 105, have been called for payment on February 1.

CHATTANOOGA & ATLANTA.—See Tennessee, Alabama & Georgia.

CHATTANOOGA SOUTHERN.—See Tennessee, Alabama & Georgia.

COLORADO & SOUTHERN.—This company has sold to Proctor & Borden, New York, \$1,400,000 Colorado & Southern refunding and extension 4½ per cent. bonds. Proctor & Borden are offering these bonds and \$1,700,000 of the same issue bought in the open market, making a total of \$3,100,000 bonds at a price to yield 4.60 per cent. A letter from President Darius Miller says that the proceeds of the sale of the \$1,400,000 bonds, together with the proceeds of the sale of \$3,000,000 bonds sold in June, are being used to pay for building a line from Walsenburg, Col., to Pueblo. The company now uses Denver & Rio Grande tracks between Walsenburg and Pueblo.

DELAWARE & HUDSON.—The New York Public Service Commission, Second district, has authorized the Delaware & Hudson to issue \$7,000,000 4 per cent. refunding mortgage bonds, to be sold at not less than 95. Of the proceeds of these bonds \$4,494,320 is to be used to pay outstanding notes, and the balance is to be used for improvements and additions.

GLASDEN & BIRMINGHAM.—See Tennessee, Alabama & Georgia.

GRAND TRUNK PACIFIC.—The minister of railways and canals of Canada has received a telegram from Charles M. Hays, president of the Grand Trunk Pacific Railway, asking that the Grand Trunk Pacific be allowed to submit a proposition to operate the Hudson Bay Railway, which the Government is to build. Mr. Hays also offers to build a line from Saskatoon to the pass, where the Hudson Bay Railway will begin. This will be a counter proposition to the one made recently by the Mackenzie and Mann (Canadian Northern) interests.

MISSOURI, KANSAS & TEXAS.—At a conference on January 9, representatives of 16 towns on the Texas Central passed resolutions favoring a law which shall permit the Missouri, Kansas & Texas to take over the operation of the Texas Central.

NEW BRUNSWICK SOUTHERN.—See Canadian Pacific.

NEW YORK, NEW HAVEN & HARTFORD.—This company has sold \$10,000,000 4½ per cent. notes to a Boston syndicate headed by F. S. Moseley & Co. The notes were offered on a 4¼ per cent. basis and quickly sold. They will run until March 1, 1912. Proceeds of the New Haven note sale are presumably for the general corporate purposes. New Haven has \$3,350,000 de-

benture notes maturing this year, so that a portion of the money received from the new notes will take care of these maturing obligations.

NEW YORK, NEW HAVEN & HARTFORD.—See Boston Railroad Holding Co.

NORFOLK SOUTHERN.—The directors have declared an initial quarterly dividend of one-half of 1 per cent., payable February 1. This places the stock on a 2 per cent. basis.

PENNSYLVANIA SOUTHERN.—See Pittsburgh, Summerville & Clarion.

PITTSBURGH, SUMMERVILLE & CLARION.—*The Commercial & Financial Chronicle* says that the new interests, which several months ago acquired control of this 21-mile line, have leased it to the Pennsylvania Southern, which has \$200,000 stock and operates one mile in addition to its leased line.

SEABOARD AIR LINE.—The directors have authorized the sale of \$19,000,000 refunding mortgage 4 per cent. bonds to provide cash and to pay for the retirement of \$14,651,000 collateral trust 5 per cent. bonds due in May. These bonds are part of \$125,000,000 refunding mortgage 4 per cent. bonds provided for by the reorganization plan, none of which having been previously sold. Blair & Co., New York, and associates are to underwrite the bond sale, and it is expected that the sale will net the railway company 80 per cent.

Stockholders are to vote at a special meeting January 30 on the question of authorizing a new mortgage to secure \$35,000,000 new 5 per cent. bonds. This mortgage will replace the present mortgage securing \$12,000,000 authorized bonds.

ST. MAURICE VALLEY.—See Canadian Pacific.

ST. LOUIS & SAN FRANCISCO.—The \$7,000,000 15-20 year 5 per cent. bonds recently offered by Speyer & Co., New York, at 87 to yield 6¼ per cent., have been oversubscribed for.

TENNESSEE, ALABAMA & GEORGIA.—A press despatch from Chattanooga says that the Chattanooga & Atlanta, the Chattanooga Southern and the Glasden & Birmingham are to be merged, and a new company—the Tennessee, Alabama & Georgia—is to take over the operation.

TEXAS CENTRAL.—See Missouri, Kansas & Texas.

WABASH.—James Pollitz, who bought 1,000 shares of Wabash common stock in 1906, and who has been suing the company on various grounds ever since, has been given permission to bring suits against the railway company and against certain of its officers for an accounting of the \$10,000,000 Wabash stock issued in 1904 for bonds of the Wabash-Pittsburgh Terminal.

WABASH-PITTSBURGH TERMINAL.—See Wabash.

The chairman of the railways commissioners for the Australian State of Victoria for the past seven years has been an American railway man who has held responsible railway positions in the United States and Canada. He retired from his position on December 1, after a successful management of the government railways of this state which had previously been run at a loss. He was employed to run the government railways on a paying basis and the results achieved during the seven years ended June 30, 1910, show that this was accomplished. The deficit for the seven years ended June 30, 1903, was \$9,304,982, while the surplus for the succeeding seven years was \$4,558,577, notwithstanding that \$3,398,715 was spent in the last seven years for special expenditures and charges in liquidation of extraordinary liabilities, against only \$781,706 in the prior seven years. The increased number of passengers carried over the preceding seven years (1896-1903) was 41 per cent. and the increase in number of tons of goods over the same period 32 per cent., and live stock 38 per cent. During 1903-1910 the average train load increased by 40 per cent. over 1896-1903, the average carload by 17 per cent., and the estimated increase of goods and livestock was 61 per cent., while the increase of freight and mixed train mileage run was only 7 per cent. A number of reforms were instituted, and legislation was secured to prevent the scalping of tickets, and other abuses. It is worthy of note that the conditions governing transportation of goods, livestock, etc., and the conveyance of passengers, parcels, etc., have been revised and made uniform throughout Australia.

Late News.

The items in this column were received after the classified departments were closed.

Charles A. Kline has been appointed assistant general passenger agent of the Southern Railway, with office at Washington, D. C.

All trunk line roads are filing passenger tariffs with the Interstate Commerce Commission in strict conformity with Section IV of the law, effective February 17, instead of asking relief under the long and short haul clause. This means that they propose to cut out group ratings. The passenger tariffs being filed represent both increases and reductions, the changes being in all cases only a few cents. Thus the new rate to Pittsburgh from Philadelphia will be \$8.75, instead of \$8.73 as at present.

Effective February 1, the lines of the Rock Island System will be divided into three operating districts as follows: W. S. Tinsman, general manager of the Chicago, Rock Island & Pacific, at Chicago, has been appointed general manager of the first district, embracing the lines east of the Missouri river, and the line from St. Joseph, Mo., to Horton, Kan. A. E. Sweet, assistant to president, at Chicago, has been appointed general manager, at Topeka, Kan., in charge of the second district, embracing the lines west of the Missouri river (except the line from St. Joseph, Mo., to Horton, Kan.), and north of Caldwell, Kan., including the line from St. Louis, Mo., to Kansas City, and the line extending southwest to Tucumcari, N. Mex. W. M. Whitenton has been appointed general manager, at Fort Worth, Texas, in charge of the third district, embracing mileage south of Caldwell, Kan., lines south and east of Tucumcari, N. Mex., and the line to Dawson. H. M. Sloan, vice-president, in New York, succeeds Mr. Sweet, and his former office has been abolished.

In the hearing at Washington on the western rate advances, John H. Atwood, representing the shippers' committee of Chicago, followed Mr. Morrissey (whose testimony is given elsewhere in this issue) with an academic discussion as to the proper basis upon which to calculate the fair return to the roads. He concluded that the right thing for the commission to do was to ascertain what has been actually invested and intelligently administered. Attorney Atwood argued that the constitution which confers the power and imposes the duty upon the federal government of establishing and maintaining highways, the relation between the carrier and the government should be that of agent and principal. Therefore, the rate question should be considered from the standpoint whether the roads are performing their duty of transportation as the government would have it done. Referring to the statement made that railway bonds were not readily marketable, Attorney Atwood predicted that if a well-managed road would present its bonds in denominations small enough to be reached by the small investor, say \$100 face value, and would offer them for public subscription like government bonds, the issue would be largely oversubscribed. Counsel advised the railways that before they attempted to levy further tribute upon the people, they should cancel their contracts with the express companies, discontinue selling bonds in such a way as to make large profits to a syndicate, sell their stocks so that for every dollar of stock value a dollar will go into their treasuries. With these leaks stopped, their financial condition would be improved. Taking the Chicago & Northwestern, the Atchison, the St. Paul and the Burlington as the dominant transportation factors in the territory under consideration, counsel proceeded to present statistics of their earnings for 1910 to show that they had, after paying expenses, interest, dividends and taxes, then paid large sums for additions and betterments and sinking fund. These latter items, he claimed, could not be fairly deducted from a net operating income and have the remainder fairly declared to be the net. Mr. Atwood continued his argument at the afternoon session, dwelling upon the profits earned by the carriers and declaring that they were now receiving as much as they were entitled to. He said that it was revolting to sound business sense that railway companies should give stock at par to stockholders when it could have been sold 25 or 30 points higher in the open market.

Supply Trade Section.

The Davenport Locomotive Works, Davenport, Iowa, has opened an office at 30 Church street, New York, in charge of H. T. Armstrong.

H. B. Taylor, special designing engineer of the Federal Signal Company, Albany, N. Y., has taken a similar position with the Hall Signal Company, New York, with office at Garwood, N. J.

The Beaumont, Texas, plant of the International Creosoting & Construction Company, Galveston, was recently damaged by fire. The loss, which is estimated at \$80,000, is fully covered by insurance.

William Stevenson, for many years with the McGuire-Cummings Manufacturing Co., Chicago, has been appointed special representative of the Indian Refining Co., Cincinnati, Ohio, with headquarters in Chicago.

Grant B. Shipley has resigned his position as engineer of mining and timber preserving machinery of the Allis Chalmers Company, Milwaukee, Wis., and is now president of the Pittsburgh Wood Preserving Company, Pittsburgh, Pa.

The Chicago Car Leasing Company has been incorporated in Maine to make and lease cars of all kinds. The company is authorized to issue \$60,000 common and \$40,000 preferred stock. The names of the real promoters are not made public.

Frank P. Smith, vice-president of the Hobart-Allfree Company, Chicago, with office at New York, is planning to go into business for himself, handling several accounts in eastern territory on a commission basis. Mr. Smith's field will be particularly locomotive and steam specialties.

The Chicago Pneumatic Tool Company, Chicago, acquired the gasoline hand car business of the Duntley Manufacturing Company, Chicago, on January 1, and will in future make these cars on a large scale. These motor cars are now in use on 83 railways in this country.

W. P. Pressinger has sold his interest in the Keller Manufacturing Company, Philadelphia, Pa., and has resigned his position as vice-president of that company to become manager of the compressor department of the Chicago Pneumatic Tool Company, Chicago, with headquarters in New York.

In a notice published in the *Railway Age Gazette* of January 13, referring to the manufacture of oil headlights by the Dressel Railway Lamp Works, New York, for the Lake Shore & Michigan Southern to comply with the headlight statute in Indiana, the candle power was given, through a typographical error, as 150 instead of 1,500.

Edgar Allen & Company, Ltd., Imperial Steel Works, Sheffield, England, whose principal American office and warehouse is at Chicago, announces that agency arrangements have been made with Roehm & Davison, Detroit, Mich., J. L. Osgood, Buffalo, N. Y., and John J. Greer & Company, Inc., Baltimore, Md. These companies will carry a large stock of Allen's high speed and carbon tool steels.

The Jerguson Manufacturing Company, Boston, Mass., has received orders from the following railways for its new Wiltbonco gage: The Baltimore & Ohio; the Denver, Northwestern & Pacific; the Buffalo, Rochester & Pittsburgh; Oregon-Washington Railroad & Navigation Company; the Norfolk & Western; the Genesee & Wyoming; the Central Vermont; the Missouri Pacific; the Chicago Great Western; the Boston & Maine; the Erie; the Southern, and the Canadian Pacific.

F. K. Shults, until recently connected with the American Steel Foundries as their representative in New York and Eastern territory, has accepted a similar position with the Bettendorf Axle Company, Bettendorf, Iowa, of which company he has been made a vice-president. Mr. Shults has opened an office in room 2040 Grand Central Terminal building, New York City. The office at 30 Church street, room 1021, will remain in charge of G. N. Caleb, vice-president, who has been with the Bettendorf company for the last eight or ten years.

Henry B. Seaman, who, after serving three years as chief engineer of the New York Public Service Commission, First district, resigned that position last September, has opened an office

at 165 Broadway, New York, as consulting engineer for railway, bridge and valuation work. Before December, 1907, when he became connected with the Public Service Commission, Mr. Seaman held several prominent engineering positions, including that of bridge engineer of the Erie, and responsible positions in the engineering departments of both the Pennsylvania and the New York, New Haven & Hartford.

The Horace L. Winslow Company, Chicago, recently exceeded its own record for promptness in its start on a large contracting work. The Pere Marquette let the contract for its new shops at Saginaw, Mich., to the Winslow company on Friday, and, in order to hasten matters, agreed to transport a portion of the material in a baggage car, which was loaded on Saturday. On Sunday one of the superintendents of the contracting company with his men was on his way to Saginaw, and on Monday actual work was begun. The work is being pushed to completion and it is expected that the time record of completing the work will in all respects equal the prompt start.

The Dearborn Drug & Chemical Works, Chicago, who has distributed its feed water treatment and lubricants through an agency in the Philippines for the past two years, has decided to open its own branch office and warehouse in Manila. F. O. Smolt, who has been connected with mining propositions since his graduation in chemistry from the University of Illinois in 1891, is now with the Dearborn company, and has gone to Manila to take charge of this work under the supervision of E. C. Brown, manager of the foreign department. Mr. Brown has been investigating steam plant and railway conditions in Japan, China and the Philippines for two years, and has made selling connections at Tokio, Tientsin, Hongkong and Shanghai.

William H. Browne, an electrical engineer, died on January 14 at his home in Brooklyn, N. Y. Mr. Browne was born in Troy, N. Y., in 1849. Coming to New York, he turned his attention to electricity and in 1888 was among the builders of the electric railway in Richmond, Va., one of the earliest electric railways in the United States. He became associated with the Westinghouse interests in New York and was made general manager of the United Electric Light & Power Co. In January, 1902, Mr. Browne became general manager and treasurer of the Stanley Instrument Co., Great Barrington, Mass., where he became identified with William Stanley. Five years later the Stanley works were merged with the General Electric Co., Schenectady, N. Y., and Mr. Browne opened offices in New York as a consulting engineer. Mr. Browne was a member of the American Institute of Electrical Engineers, of the St. Lawrence, Montreal and Catholic clubs, and was past grand master of the Knights of Columbus.

TRADE PUBLICATIONS.

Canadian Pacific.—The industrial department of this company has published a 140-page booklet, giving in tabulated form a full statement of the manufacturing and business opportunities in western Canada.

Protected Metals.—The Asbestos Protected Metal Company, Canton, Mass., has published a well illustrated 35-page booklet on asbestos protected metal, its uses and advantages. This product has been approved by the bureau of buildings of the borough of Manhattan, New York City.

Concrete Post Molds.—The D. & A. Post Mold Company, Three Rivers, Mich., is distributing a 24-page booklet, containing valuable information concerning the casting of concrete fence posts and telegraph and telephone poles. The book includes a number of photographs of post plants now in use on large American railways.

Great Northern.—The passenger department of the Great Northern has published a 38-page booklet describing "The Treasure State," Montana. The cover bears a colored photograph of Montana's exhibit at the 1909 National Corn Exposition in

Omaha, Neb., and the reading pages give the usual amount of information concerning agricultural values in that state.

Rail Clamps.—The Berry Rail Clamp Company, Fond du Lac, Wis., has issued a pamphlet describing its various designs of rail clamps. These devices are designed to prevent the track from creeping; it is claimed that they cannot work loose from the rail and that on curves they serve to counteract the outward pressure of the wheel flanges, thus helping to keep the track in alinement.

Electric Staff System.—The Union Switch & Signal Company, Swissvale, Pa., has published its bulletin No. 51 on the automatic electric staff system, especially adapted to the operation of single track electric railways. This bulletin describes fully the many advantages of this system. It contains 10 pages and is illustrated. Bulletin No. 52, published by the same company, is a reprint of an editorial on the electric train staff published in the *Railway Age Gazette* of December 2, 1910.

RAILWAY STRUCTURES.

BELLVILLE, TEX.—The Gulf, Colorado & Santa Fe, according to local press reports, will build a new brick passenger station at the foot of Main street and will convert the present station into a freight depot.

CLEVELAND, OHIO.—An officer of the Lake Shore & Michigan Southern writes that the Lake avenue subway in the city of Cleveland will be built during 1911. The work consists of the reconstruction of an existing subway now under three tracks and includes removing a double arch carrying three tracks and substituting therefor a steel bridge, spanning a greater width of street and carrying four tracks. No contracts have been let for the work. It is undecided whether the work will be carried out on the Madison street subway in the same city.

CHATTANOOGA, TENN.—See Tennessee, Alabama & Georgia under Railway Construction.

DULUTH, MINN.—The Duluth & Iron Range has let a contract for wrecking its old dock No. 1 preparatory to replacing it with a new steel dock.

EVERETT, WASH.—See Gold Bar, Wash.

GOLD BAR, WASH.—The Great Northern has bought 73 acres of land, it is said, at Gold Bar, as a site for a new station, a shop, roundhouses and storage tracks. It is also understood that the company will increase its yard facilities at Everett.

GUELPH, ONT.—Arrangements are said to have been completed between the city officials and the Grand Trunk for building a new passenger station in Guelph.

LOS ANGELES, CAL.—The Southern Pacific has been denied permission by the United States War Department to construct a direct lift bridge at San Pedro harbor, and an order has been issued that a draw bridge of the bascule type be installed within 12 months, capable of operating in 60 seconds. (December 9, p. 1133.)

NEW YORK.—The new subway station on the Broadway branch of the Interborough Rapid Transit Company, at 191st street, in the borough of Manhattan, is now open for traffic.

PRESQUE ISLE, MICH.—The Lake Superior & Ishpeming has requested permission from the city council to build a trestle across Presque Isle drive to carry construction material to the site of the new dock which is to be built at this point. The new ore dock will be located 200 ft. southwest of the present one and parallel with it.

ST. LOUIS, MO.—See Manufacturers' Railway under Railway Construction.

QUINCY, ILL.—The Chicago, Burlington & Quincy is considering a plan for greatly increasing the size of its terminal buildings.

SAN BENITO, TEXAS.—The St. Louis & San Francisco has appropriated \$50,000 for a pre-cooling plant to care for the large quantity of truck shipped from this point.

SOMERSET, KY.—The Queen & Crescent is reported to be contemplating extensive shop enlargements.

WILKESBARRE, PA.—Plans are being made, it is said, for a new bridge to be built by the city officials over South street. It is understood that some of the railways entering Wilkesbarre will pay part of the cost of this improvement.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Grand Trunk Pacific is said to have ordered 12 locomotives. This is not confirmed.

The Philadelphia & Reading will build 20 passenger locomotives at its shops in Reading, Pa.

The Illinois Central is preparing specifications on 5 Pacific type, 20 consolidation and 20 mikado locomotives.

The Danish State Railways, Copenhagen, will order 23 locomotives. They are not to be built in Denmark.

The Canadian Pacific, as mentioned in the *Railway Age Gazette* of January 13, has ordered 75 locomotives from the Canadian Locomotive Company and the Montreal Locomotive Works. The specifications for these locomotives are as follows:

Type.	30 Consolidation.	1 Mallet 0-6-6-0
Simple or compound.....	Simple	Simple
Weight on drivers.....	195,000 lbs.	262,000 lbs.
Total weight	220,000 lbs.	262,000 lbs.
Cylinders	24 in. x 32 in.	20 in. x 26 in.
Valves, diameter and kind....	12 in. piston	11 in. piston
Diameter of drivers.....	.....	58 in.
Boiler type	Extended wagon top	Extended wagon top
Working steam pressure.....	180 lbs.	200 lbs.
Heating surface, tubes	2,631 sq. ft.	2,771 sq. ft.
" " firebox	180 sq. ft.	185 sq. ft.
" " total	2,811 sq. ft.	2,956 sq. ft.
Superheater surface	450 sq. ft.	549 sq. ft.
Equivalent heating surface....	3,486 sq. ft.	3,780 sq. ft.
Tubes, number and size.....	272, 2 in.; 24, 5 in.	18, 2 in.; 167, 2 1/4 in.; 22, 5 1/4 in.
Length of tubes between sheets.	15 ft. 1 1/2 in.	20 ft. 3/4 in.
Firebox, type	Radial stayed with cross stays.	Radial stayed with cross stays.
" length inside	103 3/16 in.	120 in.
" width inside	5 ft. 9 3/4 in.	69 7/8 in.
" material and maker....	Otis, steel	Otis, steel
Grate area	49 sq. ft.	58 sq. ft.
Tank capacity, water.....	5,000 gals.	5,000 gals.
Tank capacity, coal.....	10 tons	12 tons
Axles, main	10 in. x 14 in.	9 1/2 in. x 12 in.
Axles, others	9 1/2 in. x 14 in.	9 in. x 12 in.

Type.	12 Pacific type.	10 Switching 0-6-0
Simple or compound.....	Simple	Simple
Weight on drivers.....	135,000 lbs.	126,000 lbs.
Total weight	215,000 lbs. (for 7) 214,000 lbs. (for 5)	126,000 lbs.
Cylinders	21 in. x 28 in.	18 in. x 26 in.
Valves, diameter and kind....	11 in. piston	11 in. piston
Diameter of drivers.....	75 in. (for 7) 69 in. (for 5)	52 in.
Boiler type	Extended wagon top	Straight top
Working steam pressure.....	200 lbs.	200 lbs.
Heating surface, tubes	2,777 sq. ft.	1,406 sq. ft.
" " firebox	183 sq. ft.	138 sq. ft.
" " total	2,960 sq. ft.	1,544 sq. ft.
" " superheater	539 sq. ft.	.....
Equivalent heating surface....	3,767 sq. ft.	.....
Tubes, number and size.....	193, 2 1/4 in.; 22, 5 in.	234 2 in.
" outside diameter .....	.....	.....
" length between sheets..	19 ft. 4 1/2 in.	11 ft. 5 1/2 in.
Firebox, type	Radial stayed with cross stays.	Radial stayed with cross stays.
" length inside	7 ft. 10 1/2 in.	8 ft. 3/4 in.
" width inside	5 ft. 9 7/8 in.	3 ft. 6 3/4 in.
" material and maker....	Otis, steel	Otis, steel
Grate area	45.6 sq. ft.	29 sq. ft.
Tank capacity, water.....	5,000 gals.	3,500 gals.
Tank capacity, coal.....	10 tons	4 tons
Axles, main	9 1/2 in. x 12 in.	8 1/2 in. x 10 in.
Axles, others	9 in. x 12 in.	.....

Type.	4 Mallet 0-6-6-0	18 Ten-wheel.
Simple or compound.....	Compound	Simple
Weight on drivers.....	262,000 lbs.	141,000 lbs.
Total weight	262,000 lbs.	190,000 lbs.
Cylinders	34 in. and 23 in. x 26 in.	21 in. x 28 in.
Valves, diam. and kind, H. P..	11 in. piston	11 in. piston
Valves, diam. and kind, L. P..	12 in. piston	.....
Diameter of drivers.....	58 in.	.....
Boiler type	Extended wagon top	Extended wagon top
Working steam pressure.....	200 lbs.	180 lbs.
Heating surface, tubes	2,602 sq. ft.	2,238 sq. ft.
" " firebox	180 sq. ft.	180 sq. ft.
" " total	2,782 sq. ft.	2,418 sq. ft.
" " superheater	549 sq. ft.	409 sq. ft.
Equivalent heating surface....	3,846 sq. ft.	3,032 sq. ft.
Tubes, number and size.....	16, 2 in.; 154, 2 1/4 in.; 22, 5 1/4 in.	240, 2 in.; 24, 5 in.
Length of tubes between sheets.	20 ft. 0 3/4 in.	14 ft. 2 7/8 in.
Firebox, type	Radial stayed with cross stays.	Radial stayed with cross stays.
" length inside	120 in.	8 ft. 6 1/4 in.
" width inside	69 7/8 in.	5 ft. 9 7/8 in.
" material and maker....	Otis, steel	Otis, steel
Grate area	58 sq. ft.	49 sq. ft.
Tank capacity, water.....	5,000 gals.	5,000 gals.
Tank capacity, coal.....	12 tons	10 tons
Axles, main	9 1/2 in. x 12 in.	9 1/2 in. x 12 in.
Axles, others	9 in. x 12 in.	9 in. x 12 in.

CAR BUILDING.

The New York, New Haven & Hartford is in the market for 14 sleeping cars.

The Central Railroad of New Jersey is in the market for 250 refrigerator cars.

The Central of Georgia is taking prices on special equipment for 300 freight cars.

The Louisville & Nashville is said to have ordered 32 steel coaches. This is not confirmed.

The Illinois Central will build 100 36-ft., 40-ton, all-wood logging cars at its Burnside shops.

The Great Northern, it is said, has ordered 100 additional freight cars. This is not confirmed.

The New York Central & Hudson River has ordered 20 milk cars for the Merchants Despatch Transportation.

The Northwestern Pacific has ordered 3 baggage cars and 2 combination baggage and passenger cars from the American Car & Foundry Company.

The Pennsylvania has ordered 1,000 hopper coal cars for its eastern lines. Six hundred were ordered from the Cambria Steel Company, 250 from the Pressed Steel Car Company and 150 from the American Car & Foundry Company. This company is in the market for 500 box cars, 300 gondolas and 30 flat cars for its western lines.

IRON AND STEEL.

The Buffalo, Rochester & Pittsburgh has ordered 5,600 tons of 90-lb. rails.

The Great Northern is said to have ordered 3,800 tons of rails from the Illinois Steel Company.

The Delaware & Hudson has ordered 7,500 tons of 90-lb. rails from the Bethlehem Steel Company.

The Pennsylvania has ordered 70,000 tons of rails from the Carnegie Steel Company and the Illinois Steel Company; 63,000 tons from the Cambria Steel Company, and 8,000 tons from the Bethlehem Steel Company.

General Conditions in Steel.—At the dinner given to ninety-two steel men at the Waldorf-Astoria, New York, on January 11 by Judge Gary, it was unanimously decided not to make any cut in steel prices. It was thought that there would be enough orders to keep most of the mills busy. In spite of this decision, those who had looked for a downward revision of prices are not discouraged. There has been talk of a general reduction of prices to be made as soon as the prospect for orders improves. No marked improvement is looked for before March.

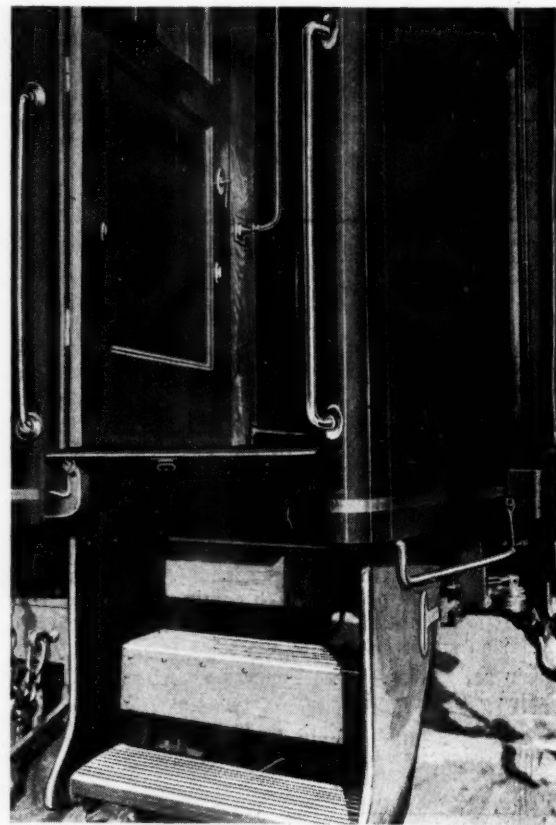
SIGNALING.

The length of lines block signaled, automatic and manual on the Baltimore & Ohio, is now 1,265 miles, which is 72 miles more than one year ago. The length of road equipped with automatic block signals is 218 miles, an increase of 29 miles. During the present year the B. & O. expects to install automatic signals on the following sections, all double track: Connellsville to Bessemer, 46.8 miles; McKeesport to Laughlin Junction, 11.9 miles; Goehring to New Castle Junction, 15.3 miles.

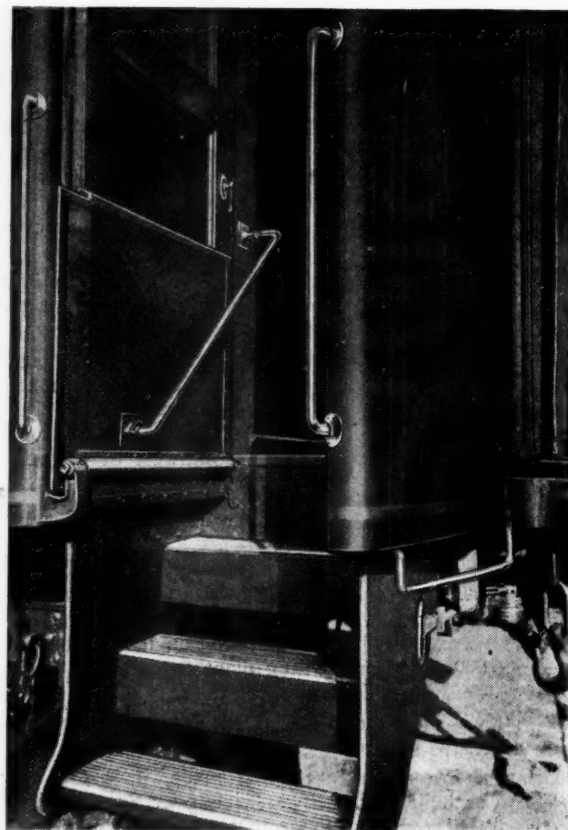
Vestibule Trap Door.

A metal trap door, arranged for loading and unloading passengers at high station platforms, has been put on the market by the O. M. Edwards Company, Syracuse, N. Y. The top of the door is covered with rubber and has a threshold extending beyond the outside of the vestibule door when it is closed. This threshold is roughened to prevent slipping, and slopes slightly to keep water from running inside the vestibule. The bottom surface of the door is smooth and is easily kept clean. The drop grab handle, as shown, fastens near the hinge, making a convenient arrangement for entering and leaving the car when the drop door is not used. All the adjustments to the door are made from the outside of the car; the adjusting nut in the ratchet bracket being in the corner post, may be easily removed, and the door may be taken from the car in less than half a

minute without removing a screw or a bolt. The illustrations show the door in the closed and open positions. It is light and easily handled, and is especially appreciated in stations such as the Pennsylvania and the Grand Central terminals, New York, where passengers are loaded and unloaded at the car floor level.



Vestibule Trap Door; Closed.



Vestibule Trap Door; Open.